IMPROVING AND EXPANDING STI DIAGNOSIS IN A LOW-RESOURCE SETTING: UNDERSTANDING TREATMENT SEEKING BEHAVIOR AND THE ACCEPTABILITY OF SELF-COLLECTED SAMPLES FOR STI TESTING AMONG ADULTS IN RAKAI, UGANDA

by
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Abstract

Background: Daily, approximately one million people become infected with one of four sexually transmitted infections (STIs) – *C. trachomatis* (CT), *N. gonorrhea* (NG), syphilis and trichomoniasis (TV). Accurate and timely STI diagnosis is critical to prevent disease spread. This dissertation focused on STI treatment seeking behavior and self-collected samples (SCS) for STI testing as means to improve and expand STI diagnosis in low-resource settings.

Methods: This research was conducted in Rakai, Uganda as a part of the STI Prevalence Study (STIPS), nested within the Rakai Community Cohort Study. From a population-based sample of all consenting participants aged 18-49 in two communities, we presented descriptive data to characterize treatment seeking behavior among 962 participants who reported STI-related symptoms. We then used modified Poisson regression to identify factors associated with clinic treatment. We also conducted interviews with 36 adults who self-collected a sample for STI testing, as well as nine key informants, to assess the acceptability of SCS and explore service delivery preferences for a SCS for STI testing program.

Results: Fifty-seven percent of adults with STI-related symptoms reported seeking any treatment for their symptoms; seeking treatment at a clinic was 47% among men and 48% among women. For men, being from an inland community (PRR: 1.43, 95%CI: 1.12-1.83) and having more than one STI-related symptom (PRR: 1.73, 95%CI: 1.36-2.21) increased the likelihood of seeking clinic

treatment. For women, having more than one STI-related symptom (PRR: 1.41, 95%CI: 1.12-1.78) increased the likelihood of seeking clinic treatment. SCS were acceptable among participants with and without symptoms, though healthcare worker (HCW)-collection was often preferred. While we did not find a single most preferred approach for SCS/STI testing service delivery; common themes of confidentiality/privacy and HCW interaction explained participant's high acceptance of, and preference for, home- and facility-based approaches.

Conclusions: Our findings indicate that up to half of individuals with STI-related symptoms may not be seeking clinical care. SCS may be an acceptable, additional means to expand STI diagnostic testing in our setting, and a patient-centered approach for service delivery may be needed to in order to make the service acceptable to the larger population.

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Dedication

This dissertation is dedicated to my *Mammanjoon* and *Aughajoon*: Soltan Nahidipoor and Sayed Jalal Parvizi. I hope it makes you smile.

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List of Terms and Abbreviations

ART	Antiretroviral therapy
CT	*Chlamydia trachomatis*
DHS	Demographic and Health Survey
GPS	Global positioning system
HCW	Healthcare worker
HIV	Human immunodeficiency virus
HIVST	HIV self-testing
HPV	Human papillomavirus
HSV-2	Herpes simplex virus type 2
KI	Key informant
NG	*Neisseria gonorrhoeae*
PrEP	HIV pre-exposure prophylaxis
PRR	Prevalence risk ratio
RHSP	Rakai Health Sciences Program
RCCS	Rakai Community Cohort Study
SCS	Self-collected samples
SCS/STI testing	Self-collected samples for STI testing
SDGs	United Nations Sustainable Development Goals
STI	Sexually transmitted infection
STIPS	STI Prevalence Study
TV	*Trichomonas vaginalis* (trichomoniasis)
WHO	World Health Organization

Chapter 1. Introduction

1.1 Specific Aims

Non-HIV sexually transmitted infections (STIs) are an issue of growing concern; in settings with a widespread availability of combination HIV interventions, STI incidence is rising.[1–3] With the recent success of HIV control programs, low-resource settings like Uganda may follow a similar trajectory. Data from the 2016 Demographic and Health Survey (DHS) show that the self-reported prevalence of previous STIs and/or STI symptoms for Ugandans aged 15-49 was 24.4% among women and 13.6% among men, with over a quarter of these persons stating that they did not seek any advice or treatment for their symptoms.[4] Timely and accurate diagnosis of infection is critical to STI control, including prevention of sequelae, and will be essential in curbing any rise in STIs the country may experience in the near future.

Treatment seeking behavior can be a limiting factor to timely and appropriate STI diagnosis. Delayed or inappropriate treatment seeking can result in an improper diagnosis, ineffective treatment and the continued spread of disease.[5,6] Various factors can influence the decision to seek treatment, including individual-level and contextual factors.[5] These factors not only influence when and where an individual seeks treatment, but also if they seek any treatment at all.[5] However, with the exception of DHS data, current, population-based data on treatment seeking behavior in sub-Saharan Africa and other low-resource settings are scarce.

Etiologic testing is also critical for accurate STI diagnosis. Like most other low-resource settings, Uganda currently uses the syndromic approach to manage STIs.[7] This involves an examination by a healthcare worker and subsequent antibiotic administration for individuals who report symptoms common to prevalent STIs in the region. While practical, the approach is limited due to low sensitivity and specificity and the high proportion of asymptomatic infections or failure to recognize symptoms.[8] Given these limitations, the World Health Organization (WHO) has recommended a global shift away from syndromic case management in favor of etiologic testing where feasible and cost-effective.[9] With an improved infrastructure and laboratory capacity due to the scale-up of HIV programs, Uganda stands ready for such a shift. Self-collected samples (SCS) for etiologic genital testing may be a way to expand STI case management. By allowing the patient to collect a sample themselves, studies suggest that SCS for STI testing (SCS/STI testing) can circumvent barriers to clinic- and/or clinician-based STI case management, like inaccessibility, stigma or privacy concerns.[10–12] Despite its potential, SCS/STI testing programs are expensive and thus uncommon in low-resource settings, and their acceptability is not well documented.

This dissertation focused on improving and expanding STI diagnosis in Uganda and similar low-resource settings, and assessed treatment seeking behavior as well as the acceptability of SCS/STI testing among adults in Rakai, Uganda. This

research was nested within a larger study examining population-level STI prevalence through the Rakai Community Cohort Study (RCCS), and had the following aims:

1. Describe current treatment seeking behavior among adults with STI-related symptoms and identify factors associated with seeking clinic treatment.
2. Explore the acceptability of SCS/STI testing.
3. Explore service delivery preferences for a SCS/STI testing service.

1.2 Organization of the dissertation

This dissertation is organized in six chapters. The first chapter introduces the research aims. Chapter 2 provides context for the dissertation; it includes a literature review and describes the theoretical grounding and conceptual framework that guides the research. The second chapter also describes the study setting and the parent study under which this research was conducted. Chapter 3 presents a summary of the study design and analysis methods. Chapters 4 through 6 present the main dissertation findings. Chapter 4 describes current treatment seeking behavior among adults with STI-related symptoms in Rakai, Uganda and presents descriptive data on treatment seeking as well as factors associated with clinic treatment seeking (Aim 1). Chapter 5 explores the acceptability of SCS among adults (Aim 2). Chapter 6 explores service delivery preferences for a SCS/STI testing service among adults (Aim 3). Finally, Chapter 7 summarizes the key findings and conclusions, study strengths and limitations.

A discussion of program implications, as well as recommendations for future research, is also included in chapter seven.

Chapter 2. Background and Significance

2.1 Literature review

2.1.1 The need for a renewed focus on STI control in Uganda

Sexually transmitted infections (STIs) are a global issue of growing concern. Every year, there are an estimated 357 million new infections with one of the four curable STIs – *C. trachomatis* (CT), *N. gonorrhea* (NG), syphilis and trichomoniasis (TV) – across the world, with about one million STIs acquired every day.[13] STI infections have deleterious effects on both reproductive health and quality of life and can increase the risk of HIV acquisition three-fold.[13–15] Sub-Saharan Africa (SSA) – where over two-thirds of new HIV cases and AIDS-related deaths occur – accounts for approximately 40% of the global STI burden[16] and the largest per-capita rates of syphilis, NG, TV, and herpes simplex virus-2 (HSV-2) globally, with the majority of African cases occurring among heterosexual individuals.[17,18] In 2016, the World Health Organization (WHO) identified the health sector response to the STI epidemic as critical to achieving the 2030 United Nations Sustainable Development Goals (SDGs).[16]

While HIV incidence in SSA is generally declining, incidence trajectories among non-HIV STIs are unclear. SSA has historically seen the world's highest burden of HIV.[19] However, data suggest that HIV incidence is declining with the scale up of combination HIV prevention interventions in many African settings.[20–22] This includes Rakai, Uganda where a 42% decline in HIV incidence was observed following scale-up of antiretroviral therapy and voluntary medical male

circumcision programs, and delay of adolescent sexual debut.[21] Recent data on STI trends in the U.S. and Europe suggest increasing STI incidence simultaneous with the rollout of combination HIV prevention strategies, possibly due to behavioral disinhibition with perceived HIV protection, the use of HIV pre-exposure prophylaxis (PrEP), and a decline in the perceived need for condom use.[1–3] While limited, Uganda DHS data also show an increase in self-reported STIs and STI symptoms in both men and women since 1995 (Table 1). If Uganda – with its reduction of incident HIV following combination HIV interventions – follows a similar trajectory to the U.S. and Europe, STI rates in the country may be expected to rise further in the coming years.

Table 1. Percentage of persons 15-49 years who ever had sexual intercourse who reported having an STI or STI symptoms in the past 12 months (Uganda DHS data)

DHS	Females who reported having STI/genital discharge/ sore or ulcer	Males who reported having STI/genital discharge/ sore or ulcer
1995[23]	247 of 7,070 (3.4%)†	120 of 1,996 (6.0%)‡
2000-01[24]	1,062 of 6,398 (16.6%)	90 of 1,643 (5.5%)
2006[25]	1,602 of 7,281 (22.1%)	248 of 2,056 (12.8%)
2011[26]	1,956 of 7,383 (26.5%)	249 of 1,777 (14.0%)
2016[4]	3,855 of 15,799 (24.4%)	565 of 4,155 (13.6%)†§

Data are presented as n (%).
† Reported having syphilis, NG, genital warts or other STD (non-HIV).
‡ Reported having syphilis, NG, discharge from penis, sore/ulcer on penis or other STD (non-HIV).
§ Reported having abnormal discharge from penis/sore or ulcer.

2.1.2 The importance of timely and accurate STI diagnosis for STI control

STI control programs can be guided by the standard epidemiological model for STIs, which describes the basic reproductive rate of an STI in a population to be influenced by: (a) the average probability of transmitting infection from an infected to non-infected person, (b) the average rate of acquisition of new sexual partners, and (c) the average duration of infectiousness.[5,6,27] Control programs can target their interventions on one or more of these variables in order to reduce an STI's reproductive rate. Appropriate and timely STI diagnosis and effective treatment can reduce the duration of infectiousness in an infected person and is one approach to slow disease spread in a population.

Uganda currently uses the syndromic approach to manage STIs.[7] This involves a clinic-based exam and subsequent antibiotic administration for those who report symptoms common to prevalent STIs in the region. While practical and inexpensive, the syndromic approach for STI case management can result in inappropriate and/or overtreatment of STIs and the development of antimicrobial resistance. Syndromic management of STIs also lacks the specificity of a diagnostic test and does not detect asymptomatic cases – the majority of STI cases.[10,28] Even among those with symptoms, the syndromic approach is limited; it relies upon the patient to: a) recognize their symptoms, b) ascribe those symptoms to a health-related cause and then c) seek appropriate care in order to receive effective treatment.[8] These steps may not always occur, resulting in

untreated, or ineffectively treated, individuals.[8] If left untreated, STIs can have deleterious effects on individual health and can also further the spread of STIs within the community. Given these limitations, the WHO has recently recommended a global shift away from syndromic case management in favor of etiologic testing where feasible and cost-effective.[9]

2.1.3 Improving STI diagnosis by focusing on STI treatment seeking

In this dissertation, 'treatment seeking behavior' is defined as any activity undertaken by an individual who perceives themselves to be ill or have a health problem, for the purpose of finding an appropriate remedy. This borrows from Kasl and Cobb's definition of 'illness behavior'[29] and is analogous to the term 'health seeking behavior' used in other studies.[8] A review by Ward et al. identified various factors that influence health seeking behavior for STIs in low-resource settings: symptom recognition; individual preexisting beliefs and meanings of symptoms; perceived efficacy of different treatment approaches (traditional, spiritual, western medical, or none at all); availability, quality and accessibility of services (including convenience, privacy and affordability); and social stigma.[8] These factors influence not only whether or not an individual seeks care, but also when and where they go for care.

Other studies conducted in SSA on adult treatment seeking behavior confirm Ward's findings.[30,31,40,32–39] For instance, in a study on delayed healthcare seeking among patients with STI-related symptoms in South Africa, Meyer-Weitz et al. found that individuals who delayed to seek care were more likely to be

those who treated themselves prior to seeking health care, who were female, whose friends waited before seeking treatment, who held misconceptions regarding the cause of STIs, who perceived STIs not to be serious, who valued personal autonomy in sexual behaviors and who had less positive outcome expectations of refusing sex.[36] A population-based study in Kenya, Nairobi found a gender difference in care seeking, with 20% of men versus 35% of women not seeking care, mainly because symptoms were not considered serious, symptoms had disappeared, or as a result of lack of money.[39] The study also found that because women were mostly monogamous, they did not relate their symptoms to sexual intercourse, which prevented them from promptly seeking care. Additionally, the study found that young women sought care less often, but promptly, whereas older women sought care more often but waited longer. Fonck et al. also found a major gender difference in treatment seeking for STIs among patients in Nairobi, Kenya (with females waiting almost three times as long as men to seek care),[38] as did Moses et al., who found that Kenyan women waited longer than men to attend study clinics and were more likely to continue to have sex while symptomatic.[41]

Qualitative studies have also illustrated a variety of contextual factors that influence treatment seeking. A study among individuals in Zambia found that a person's perception, how the diagnosis was determined, type and cost of treatment, the demand by the professional sector to bring sexual partners for care, as well as the attitudes of health workers, parents, and the church affected

an individual's treatment decisions.[35] A qualitative study among men in Zimbabwe found that prevailing gender norms of resilience and self-reliance, in addition to shyness and embarrassment, could delay a man's treatment seeking behavior in general, and HIV-related stigma could hinder a man's treatment seeking behavior for sexual-health concerns (especially for STIs).[34] Finally, we found one qualitative study that was conducted in 1999 among lay persons in Uganda that explored STI treatment seeking behavior.[31] The study found that STIs were perceived as naturalistic diseases caused by a tiny insect and female infertility (a complication of STIs) was perceived as a supernatural ailment. The study also found that stigma towards people with STIs other than HIV was high. As identified by the participants, sources of health care for STI patients included: public health institutions, private practitioners, traditional healers and self-treatment, with self-treatment being very common. For those with STI-related symptoms, deterrents to care at public health institutions included: long waiting times, lack of drugs, user charges, corruption and bribes by health workers, health workers abusing STI patients, lack of privacy, long distances, fear of being tested for AIDS, not being examined in the laboratory, and being given tablets instead of injections (which were preferred). The study also found a gender difference in disease perception and behavior: women were less likely to agree that their diseases were STIs, more likely to say that STI prevention depended on their partner, more likely to report that partner referral was difficult and more likely to have sex while symptomatic in comparison to men.

Data from the 2016 Uganda DHS show that over a quarter of persons who reported an STI or STI symptoms in the past twelve months did not seek any advice or treatment at all.[4] Despite this and the above information, data on STI treatment seeking behavior in Uganda are limited: first, with the exception of one study among female sex workers and truckers,[42] previous studies on STI treatment seeking behavior in Uganda were conducted before 2006 and may not accurately reflect behaviors in the current context – that is, after the rollout of HIV combination prevention services. Second, existing studies drew their samples from clinics and thereby do not include individuals who never sought treatment. Calls have been made for a broader research perspective in order to better understand sexual healthcare seeking behavior.[43] This includes a focus on non-attendance at services as well as research that uses population-based studies including non-patient samples recruited from non-medical settings. In Aim 1, we assessed population-based data collected in 2019 to better understand STI treatment seeking behavior in the general population.

2.1.4 Expanding STI diagnosis through SCS/STI testing

As aforementioned, the syndromic approach for STI case management is limited. With a global shift toward etiologic testing, SCS may be one way to expand STI case management beyond the syndromic approach. SCS/STI testing occurs when individuals take a swab or fluid sample themselves, either within or outside the clinic, and send the specimen to a laboratory for testing.[44] Research in high-resource settings shows that self-collected STI samples are as accurate as clinician-based tests,[45] and that SCS/STI testing interventions are feasible and

acceptable in a variety of populations.[46–55] Previous studies in Rakai have also demonstrated that self-administered vaginal swabs are valid and acceptable methods to screen for STIs among females and urine samples are acceptable to both females and males.[56–59]

While not a replacement for clinic-based examination and clinician counseling, SCS may be a way to expand STI case management beyond the clinician- and clinic-dependent syndromic approach.[60–62] For instance, SCS/STI testing can provide opportunities for testing outside of the clinic, such as within schools or homes.[60] Home-based STI testing programs implemented in high-resource settings allow individuals to request STI self-testing 'kits' online or in-person and receive them via post or at a prespecified pick-up location. Individuals are then able to self-collect their samples and return them to the designated laboratory through postal mail or by dropping them off in a clinic, pharmacy or other location. Testing results are then returned to the user by various means (either through the clinician, phone call or text message, etc.). A recent meta-analysis assessing the programmatic value of SCS/STI testing found that SCS increased overall uptake of STI testing services and case finding, suggesting that self-collection of STI samples could be an effective additional strategy to increase STI case management.[62]

Despite their potential, SCS/STI testing services are not common in low-resource settings. The greatest weakness in individual case management of STIs in low-

resource settings is the lack of cheap and accurate diagnostic tests.[63] Syndromic management of STIs is inexpensive and does not require a laboratory for diagnosis.[10] However, in settings like Uganda, intensive scale-up of HIV care and treatment over the past 15 years has resulted in strengthened supply chains, infrastructure and laboratory capacity. In such a context, the potential for using cheaper technologies to facilitate STI etiologic testing is becoming a more viable reality.[61] With an improved infrastructure and laboratory capacity due to the scale-up of HIV programs, Uganda and similar low-resource settings stand ready to shift toward etiologic testing.

At present, data on the acceptability of SCS for etiologic STI testing in a general population in Uganda are not common. This information is critical for successful intervention uptake and will be needed for future program development. In Aim 2, we used qualitative methods to provide data on the acceptability of self-collected genital swabs among adult males and females.

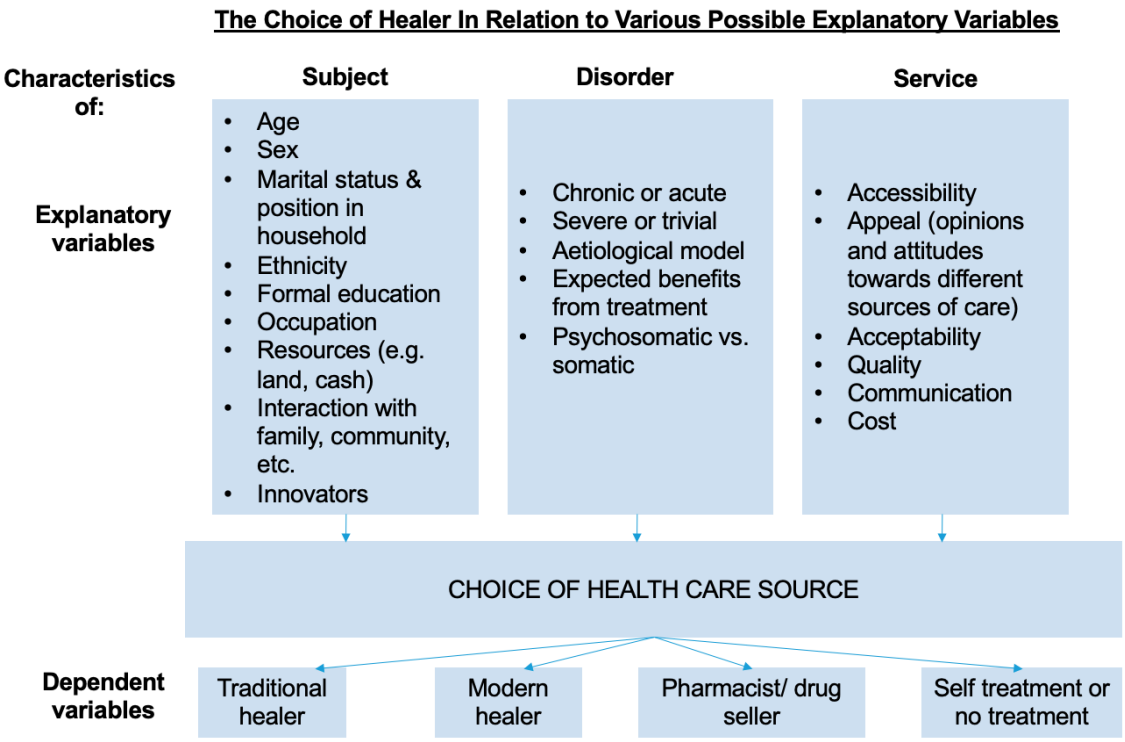
Beyond acceptability, questions also exist around how a prospective SCS/STI testing service should be delivered and what users most prefer. SCS/STI testing involves a variety of user-dependent activities, including requesting and receiving sampling materials, returning samples to the lab for testing, receiving test results and receiving treatment, if necessary. In order to be successful, SCS/STI testing programs must consider user values and preferences for service delivery in relation to these activities. In Aim 3, we used qualitative methods to explore user

acceptability of and preferences for various approaches for service delivery for a SCS/STI testing service.

2.2 Theoretical grounding

A review of the literature identifies two dominant approaches to understanding health seeking behavior and the utilization of health services: (1) 'pathways models' – which use an anthropological approach to describe the series of steps an individual takes to use a health service – and (2) 'determinants models' – which use a biomedical approach to outline a set of explanatory variables that affect that journey.[64] In his review of health-seeking behavior in developing countries, Kroeger identified three main classifications of explanatory variables that govern the use of care in a determinants framework: those related to the subject, those that relate to the disorder and those related to the service (Figure 1).[65] Kroeger's determinants model was used to inform this dissertation's analysis approach.

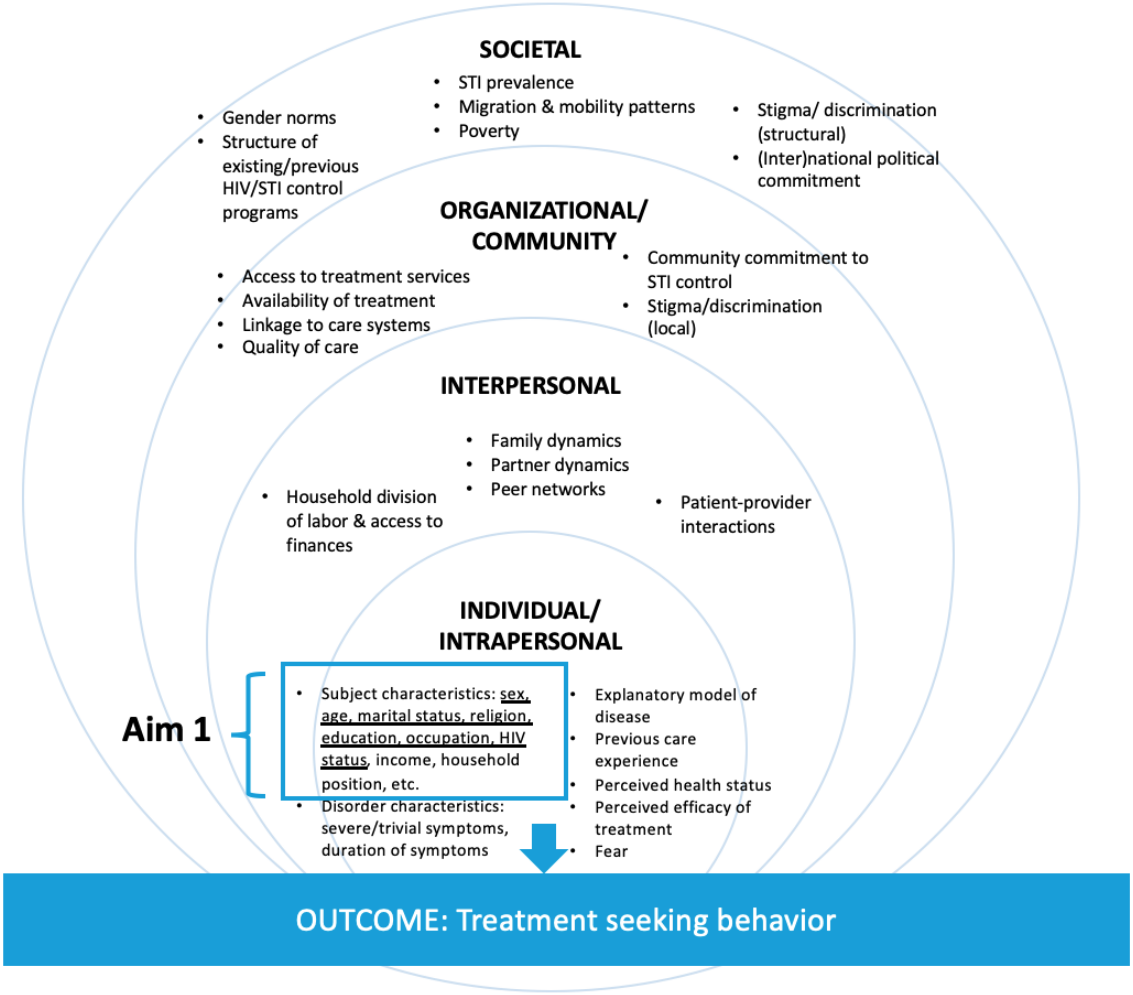
Figure 1. Kroeger's determinants model[65]



The conceptual framework that guided this dissertation research is presented in Figure 2. This framework was based upon Kroeger's framework as well as other literature exploring factors associated with STI treatment seeking behavior. Our framework also drew upon McLeroy et al.'s socioecological framework, which explicitly acknowledges the influence of the larger social and structural ecology on individual behavior.[66] Rather than a descriptive or predictive model of behavior change, the socioecological framework emphasizes the different levels of causal influence on behavior; this approach is useful for program-makers, as it compels them to consider the multiple, interacting levels that affect a behavior of interest. We used our framework to guide our analysis in Aim 1; in Figure 2, the

sociodemographic variables that are assessed in Aim 1 can be found at the individual level, and are underlined.

Figure 2. Conceptual framework



2.3 Study setting

2.3.1 STI case management in Uganda

Data from the 2016 Uganda DHS showed that the self-reported prevalence of previous STIs and/or STI symptoms for those ages 15-49 years was 24.4% among women and 13.6% among men.[4] Of those who reported having an STI or STI symptoms, 71% of women and 64% of men reported seeking advice or treatment from a clinic, hospital, or private doctor or other health professional, while 26% of women and 34% of men reported not seeking any advice or treatment at all. As per the Ugandan Ministry of Health, risk factors for prevalent STIs in Uganda include multiple sexual partners, lack of/inconsistent condom use, lack of circumcision in men, alcohol/drug use and early sexual debut.[7] The Uganda Clinical Guidelines recommend general STI prevention measures, including: (1) health education about STIs; (2) specific education on the need for early reporting and compliance with treatment; (3) notification and treatment of sexual partners; (4) patient counseling patient on risk reduction (e.g. “practice of safe sex by using condoms, remaining faithful to one sexual partner, personal hygiene”); (5) condom provision; and (6) schedule return visits, “if necessary and possible.”[7]

Since 1995, has Uganda mandated the syndromic management of STIs in all health care delivery levels in the country: in primary health care settings, syndromic management is recommended; in referral centers and hospitals where

laboratories are available, it is recommended that the syndromic approach be supplemented by lab-based case management.[7] Referral is recommended when there is evidence of ineffective treatment and/or if a clinician is not able to make a syndromic diagnosis. Laboratories are used in STI surveillance (and estimating antibiotic sensitivity), syndrome etiology and definitions, and research. As such, testing for STIs does not occur on a routine basis in Uganda; clinical management of disease is only initiated in the general population following patient complaint, and is based on health care provider experience to make a diagnosis and prescribe drugs of his/her choice. Disadvantages of the treatment algorithms include: inadequate care for asymptomatic persons (oftentimes women), drug wastage and poor predictive power of symptoms for some STIs (e.g. vaginal discharge for gonococcal and chlamydial infections among women).

According to Ugandan national guidelines, clinical assessment of STI patients involves: a) taking an appropriate history, b) performing a clinical examination and c) conducting a laboratory investigation, if necessary.[7] Should a patient report symptoms for one STI, he/she should be examined for other STIs, too. Syphilis testing is recommended for all pregnant women at the first antenatal visit. Components of case management in Uganda include: history taking (including probes on symptom duration and recent sexual partners), clinical examination (including a general physical exam and then a genital exam), correct diagnosis, early and effective treatment, advice on sexual behavior, promotion and/or provision of condoms, partner notification and treatment, case reporting

and clinical follow-up, as necessary. The provision of HIV testing is also recommended. Increased attention to history taking and risk counseling for adolescents is specifically recommended.

With respect to individuals living with HIV, the 2018 Consolidated Guidelines for Prevention and Treatment of HIV in Uganda recommends that all HIV-infected, sexually active adults and adolescents should be screened for STIs at every clinic visit. [67] Screening is recommended regardless of the individual's ART status; treatment of STIs for HIV-infected individuals also follows national treatment algorithms.

2.3.2 The Rakai region of Uganda

This research was conducted in the Rakai region of South-central Uganda (Figure 3), a rural area where the first AIDS cases in East Africa were identified.[68] Presently, Rakai has among the highest HIV prevalence levels in Uganda.[69] The majority of Rakai's population resides in small agrarian villages; however, the district also contains several mid-sized trading towns along international highways and fishing communities along Lake Victoria. The Rakai HIV epidemic is both geographically heterogeneous and virologically diverse with circulation of HIV-1 subtypes A, D, C, and multiple recombinant forms.[70,71] In 2016, HIV prevalence was documented at 43% in fishing communities, 17% in trading communities, and 14% in agrarian communities.[69]

Figure 3. Map of Rakai District, Uganda

Source: https://www.researchgate.net/figure/Political-map-of-Uganda-with-research-sites-Rakai-and-Ssese-Kalangala-Districts_fig1_41826935 [Accessed 19 September 2020]

2.3.3 The Rakai Health Sciences Program (RHSP) and the Rakai Community Cohort Study (RCCS)

Established in 1987, RHSP has a mission to conduct health research and provide health-related services in Rakai and neighboring districts.[72] In addition to providing HIV services to the area, RHSP also conducts the RCCS, one of the oldest population-based studies of HIV. The RCCS is an open, population-based cohort that was established by RHSP in 1994. Agrarian and trading community boundaries were established in 1994 as part of a community-randomized trial on STI treatment for HIV prevention. In 2011, the four largest Lake Victoria fishing communities in the Rakai region were added to the RCCS on the basis of their proximity to Rakai District's inland community populations and their growth in population associated with commercial fishing in Lake Victoria and the establishment of a fish processing/freezing plant for export to Europe.

The RCCS surveys persons aged 15-49 years in 40 communities.[69] To identify eligible cohort participants in these study communities, the RCCS first holds an informational community mobilization event. Afterward, a census is conducted: all households within the communities are systematically approached, household global positioning system (GPS) coordinates are recorded, and all resident household members are enumerated by gender, age, and duration of residence, regardless of whether they are present or absent at the time of the census. People must be resident for at least six months in agrarian and trading communities and one month with an intention to stay longer in fishing

communities for inclusion in the RCCS. The census identifies persons eligible for RCCS participation. After the census, the RCCS enrolls consenting eligible participants at central community locations (“hubs”). Eligible persons who are not identified at the hubs are approached at their household to request their participation. Up to two return visits to the household are made to enroll eligible participants, if necessary.

The RCCS survey, conducted after the census, includes all consenting residents aged 15-49 years (70-80% participation of censused population). Interviewers use structured questionnaires programmed on laptop computers to collect sociodemographic, behavioral, and health information. Venous blood is collected for HIV testing using a three rapid test algorithm with post-test results and counseling provided at the hub. Individuals who participate in the RCCS consent to HIV testing and the use of samples for future testing. Participants also consent to be re-contacted for future studies. The RCCS achieves high rates of community acceptance: approximately 94% of RCCS community residents agree to be interviewed, of whom more than 98% provide biologic samples. While behavioral outcomes are based on self-report, they have been strongly associated with anticipated biological outcomes, suggesting relatively limited self-reporting bias.

2.3.4 The STI Prevalence Study (STIPS)

The nineteenth round of the RCCS included the STIPS, a population-based study estimating the prevalence of STIs in two RCCS study communities comprising

four villages (one fishing community along Lake Victoria and one larger inland community inclusive of agrarian and semi-urban trading villages). To this end, the STIPS interviewed all eligible individuals – 1,825 sexually active men and women aged 18-49 – in four villages: Ddimo (fishing) and Bitabago, Lumbugu, and Nsozibbiri (inland), from May to October 2019. STIPS study communities were selected to represent the diversity of communities in Rakai; the study design allowed for population-based prevalence estimates for the study communities, although the estimates are not necessarily representative of all communities in the region or country overall.

In addition to the standard RCCS questionnaire, STIPS participants were administered an STI module that assessed their previous and recent symptoms as well as treatment seeking behavior. This module was an abbreviated version of the original module, which was used to estimate STI prevalence in the RCCS in the mid-1990s.[73,74]

To assess for symptoms, participants were prompted on whether they experienced any of the following conditions in the past six months (previous symptoms), and also in the past week (recent symptoms):

- For females: genital ulcer; genital discharge; thick/colored vaginal discharge; itching of the vagina or vulva; unpleasant vaginal odor; frequent urination; painful urination; pain during intercourse; bleeding during intercourse; lower abdominal pain; or none of the above.

- For males: genital ulcer; urethral discharge; frequent urination; painful urination; pain during intercourse; bleeding during intercourse; lower abdominal pain; genital warts; or none of the above.

Those participants who indicated any symptom in the past six months (including recent symptoms) were also asked if they sought treatment for those symptoms, and if so, where. Participants were allowed to specify up to three locations from the following options, in no particular order: a pharmacy/drug store, market/shop, government doctor/nurse/clinic, private doctor/nurse/clinic, the RHSP clinic, traditional healer or some other location. This information provided the data for Aim 1 of this dissertation.

In addition to the routine HIV testing offered through the RCCS, STIPs also evaluated participants for syphilis, NG, CT, TV and HSV-2. For this, genital swabs were obtained from consenting participants for STI testing: three self-administered vaginal swabs were obtained from women and three clinician-collected penile urethral meatus swabs were obtained from men. Self-administered penile urethral meatus swabs were obtained from a small sub-sample of men (n=40). The first swab was used for CT/NG testing, the second for TV testing, and the third was stored for future research. Serum was used for syphilis and HSV-2 serology. All individuals who tested positive for any STI (syphilis, TV, NG, CT, or HSV-2 with current ulcer) were provided treatment by RHSP per the Ugandan National Clinical Treatment Guidelines for Sexually Transmitted Infections. A select number of women and men who self-collected a

sample for STI testing (n=36) were invited for participation in Aims 2 and 3 of this dissertation.

2.3.5 STIs in Rakai: findings from the STD Control for HIV Prevention Trial (1994-98)

The STIPS STI module and STI testing protocols were first included in the original STD Control for HIV Prevention cluster randomized trial (1994-98).[75] Findings from the trial showed that the STI burden in Rakai communities was high: prevalence of active syphilis was ~10%, TV prevalence was 20%, and NG and CT prevalence estimates were ~4% and ~2%, respectively.

The trial also observed that approximately 30% of women and 10% of men experienced genital tract symptoms during the ten-month follow-up period.[74] Symptoms among women included vaginal itching (15.4%), pelvic pain (14.7%), vaginal discharge (9.4%) and genital ulcer (5.5%). Men reported genital ulcer (4.3%), dysuria (4.2%) and urethral discharge (1.7%). All in all, approximately 20% of the population was found to be symptomatic, and of those, 56% sought care for their symptoms (59.1% of symptomatic men and 55.4% of symptomatic women).

Finally, with regard to treatment seeking, the trial found that approximately 67% were treated at a government or private clinic, while the rest used traditional healers or treated themselves. Women used traditional healers more than men

(14.7% versus 5.1%), while men chose to treat themselves more than women (27.5% versus 11.3%).[74]

Chapter 3. Methods

We used both quantitative and qualitative research methods to address the aims of this dissertation: we used quantitative methods to for Aim 1 and qualitative methods for Aims 2 and 3. While we did use multiple methods, we do not consider this dissertation to be a mixed methods study because each of our aims addressed separate research questions, and we did not integrate or combine the methods to address them.[76] We do note, however, that the individuals who were included in our qualitative aims were sampled from the study population used in our quantitative aim. Methods for each aim are described in detail, below.

3.1 Quantitative Methods (Aim 1)

3.1.1 Aim 1 research questions

The first aim of this dissertation was to describe current treatment seeking behavior among adults with STI-related symptoms and identify factors associated with seeking clinic treatment, with the following research questions:

1. What is the prevalence of treatment seeking among adults with STI-related symptoms?
2. What is the prevalence of treatment seeking at a government or private clinic?
3. Which factors are independently associated with treatment seeking at a government or private clinic?

3.1.2 Methodology

To address Aim 1, we conducted a secondary analysis of STIPS data, which included 1,825 men and women, aged 18-49 years, from two RCCS communities of different types (fishing and inland), including a total of four villages. Data used in the analysis included sociodemographic characteristics and sexual behaviors, as well as STI symptomatology and treatment seeking behavior. Participants' STI diagnostic test results were also linked to their survey data and included in our analysis. To assess treatment seeking behavior among those with symptoms, we restricted our sample to only those participants who reported any STI-related symptoms in the past six months (n=962).

3.1.3 Analysis

For Aim 1, we estimated the overall prevalence of STI symptoms in the entire STIPS sample. We then restricted our analysis to only those who reported any STI-related symptoms in the past six months (n=962). First, we presented descriptive data for this sample as well as the prevalence of various symptoms. Second, we estimated the prevalence of seeking treatment from any location for the sample, as well as each gender and community type. We used univariable modified Poisson regressions with robust variance to compare the prevalence of any treatment seeking between genders and between community types, as well as between gender-specific community strata. Third, we estimated the prevalence of treatment seeking at each specific treatment location (e.g. government clinic, private clinic, pharmacy/drug store, market/shop, traditional

healer, other) and used univariable modified Poisson regressions with robust variance to compare the prevalence of private versus government clinic treatment seeking between genders, community types, and gender-specific community strata. Fourth, we estimated the prevalence of seeking treatment at a clinic for the full sample, as well as each gender and community type. Clinic treatment seeking was defined as seeking treatment for any STI-related symptoms in the past six months, at a private or government clinic. Those who were coded as negative for the outcome (i.e. did not seek treatment at a clinic) included individuals who sought treatment at a non-clinic location (e.g. pharmacy/drug store, market/shop, traditional healer, etc.), as well as those who sought no treatment at all. Once again, we used univariable modified Poisson regressions with robust variance to compare the prevalence clinic treatment seeking between genders, community types, and gender-specific community strata. Fifth, we used multivariable modified Poisson regressions with robust variance to determine sociodemographic and symptom-related factors independently associated with seeking clinic treatment, for each gender. We used our conceptual framework (Figure 2) to critically evaluate and select variables for inclusion in the final multivariable model. Finally, for each gender, we estimated the prevalence of any curable STI (NG, CT, TV or active syphilis) at the time of the survey comparing those who did and did not previously seek clinic treatment. We used modified Poisson regressions with robust variance to compare these estimates and explore the univariable association between

previous clinic treatment seeking and current prevalence of curable STIs, for each gender. We conducted all data analyses in STATA version 15.[77]

3.2 Qualitative Methods (Aims 2 and 3)

3.2.1 Aim 2 research questions

The second aim was to explore the acceptability of SCS/STI testing, and had the following research questions:

1. What motivates adults to provide a self-collected sample for STI testing?
2. What is their overall experience during the self-collection process?
3. How acceptable is SCS in comparison to healthcare worker (HCW)-collection?

3.2.2 Aim 3 research questions

The third aim was to explore service delivery preferences for an STI testing program that uses SCS, and had the following research questions:

1. How acceptable are various SCS/STI testing service delivery approaches?
2. Which approach is most preferred and why?

3.2.3 Methodology

To address the second and third aims, we conducted a qualitative study involving STIPS participants from the inland community who self-collected a sample for STI testing. To this end, we invited 36 STIPS participants, both with and without STI-related symptoms, from our Aim 1 study population to participate in a semi-

structured interview; all selected participants self-collected a sample for STI testing in the STIPS. The interview explored their experience self-collecting a sample and their sample collection preferences (SCS versus HCW-collection) (Aim 2). The interview also evaluated their acceptability of and preferences for various SCS/STI testing service delivery approaches (Aim 3). In addition to participants, we also conducted nine interviews with key informants (KI) to contextualize participant findings. KIs included relevant stakeholders from various levels of the health system, with experience in the field of STI control. KIs included: a community mobilizer, a village health worker, a community health worker, a traditional healer, a STIPS team leader, a STIPS clinical officer, two local hospital-based clinicians and a district health officer.

3.2.4 Analysis

Interviewers trained in behavioral science and qualitative research methods conducted semi-structured interviews in Luganda. Interviews lasted approximately one hour and were recorded. After each interview, interviewers reviewed their field notes and composed a one-page reflexive memo that reflected on their experience and highlighted any insights that could inform future data collection. YPO and the interviewers reviewed the field notes and memos after the completion each interview. Following the completion of all interviews, we translated and transcribed the recorded data. We imported the data into MAXQDA 2018 (VERBI Software, 2018)[78] for organization and initial coding. We conducted further analysis and coding using an adapted version of the Framework Method:[79] first, interviewers transcribed and translated the interviews

that they conducted. Next, we reviewed each transcript in part (by aim) and in full, to familiarize ourselves with the data. Similar to the Framework Method, we developed an analytic framework based on the research objectives and interview guides. We then used this framework to index our transcripts. After indexing all of our transcripts, we charted the data into a framework matrix by copying and pasting relevant data into their respective categories in an Excel spreadsheet, with one sheet for users and another for KIs. At this stage, we conducted iterative, open-ended coding, followed by focused coding,[80] on data within each category to generate prominent themes. We identified any prominent themes emerging from the data, as defined by: the depth of discussion any one participant provided on the topic, prevalence across participants and 'keyness' in relation to study research questions.[81] As described in the Framework Method, we constructed analytic memos and tables to help us interpret the findings. For both Aims 2 and 3, we compared themes between men and women and between those with and without symptoms. Finally, we discussed our preliminary findings within the wider research group, comprised of interviewers and Principal Investigators, to ensure that they were coherent, cohesive and comprehensive.

Chapter 4. Treatment Seeking Behavior Among Adults with STI-related Symptoms in Rakai, Uganda

4.1 Abstract

Background: Understanding treatment seeking behavior is critical to the control of sexually transmitted infections (STIs), yet current data on STI treatment seeking in low-resource settings is scarce. In such settings, where syndromic management is used to diagnose infection, seeking clinical care is the best way to ensure effective treatment. This study aims to describe STI treatment seeking behavior and identify factors associated with seeking treatment at a clinic among adults with STI-related symptoms in rural Uganda.

Methods: We conducted a population-based survey and STI testing among all consenting adults aged 18-49 in two communities (fishing and inland) in Rakai, Uganda. Out of 1,825 participants, 962 individuals self-reported STI symptoms in the past six months. We present descriptive data on treatment-seeking and STI prevalence among these 962 individuals. We also use multivariable Poisson regressions with robust variance to determine the sociodemographic and symptom-related factors independently associated with seeking STI treatment at a clinic, as well as explore the association with previous clinic treatment seeking and current STI prevalence.

Results: Forty-three percent of adults who reported STI-related symptoms in the past six months reported not seeking any treatment for their symptoms. For those who did seek treatment, 58% sought treatment at a private clinic, 28% at a government clinic, 9% at a pharmacy/drug store, 3% at a traditional healer, 2% at

a market/shop, and 5% at some other location. Overall, 47% of men and 48% of women sought treatment at a government or private clinic. Among men and women, we found no significant difference in the prevalence of clinic treatment seeking between genders or community types. When stratified by gender, independent factors positively associated with clinic treatment seeking for men included being from the inland community (PRR: 1.43, 95%CI: 1.12-1.83) and having more than one STI-related symptom (PRR: 1.73, 95%CI: 1.36-2.21). For women, the only significant factor was having more than one STI-related symptom (PRR: 1.41, 95%CI: 1.12-1.78). Approximately one-third of men and women who reported previously seeking clinic treatment for their symptoms were diagnosed with a curable STI at the time of the survey; we found no significant association between previous clinic treatment seeking and current STI prevalence for curable STIs.

Conclusions: Half of adults with STI-related symptoms in our population are not seeking appropriate care at a clinic. There is also a high proportion of STIs among those who have reported previously seeking clinic care, suggesting poor management of STI symptoms, high reinfection rates, or both, in this population. Timely and appropriate treatment is critical to control the spread of infection; we recommend that researchers further explore barriers to care and urge decision-makers to focus their resources on methods to increase STI treatment seeking in this, and similar, settings.

4.2 Introduction

Understanding STI treatment seeking behavior is critical to STI control; timely and appropriate STI treatment can reduce the duration of infectiousness and limit the spread of infection.[5,6] Treatment seeking behavior can be defined as any activity undertaken by an individual who perceives themselves to be ill or have a health problem, in order to find a remedy. Various factors can influence the decision to seek treatment, including individual-level factors such as symptom recognition, preexisting beliefs and meanings of symptoms, as well as perceived efficacy of different treatment methods.[5,6] Contextual factors such as the availability, quality and accessibility of treatment, as well as social stigma, also play a role.[5,6] These factors influence not only the timing and location of treatment seeking, but also whether an individual seeks treatment at all.[5,6]

Despite its importance, population-based data on treatment seeking in low-resource settings, such as Uganda, is scarce. In such settings, syndromic management by a healthcare worker is used to diagnose presumptive infection,[7,82] and so seeking clinical care is the best way to receive effective treatment. Data from the 2016 Uganda DHS show that, of those who reported having an STI or STI symptoms, 71% of women and 64% of men sought advice or treatment from a clinic, hospital, private doctor or other health professional, while 26% of women and 34% of men did not seek any advice or treatment.[4] Previous studies on STI treatment seeking behavior in Uganda report a variety of treatment approaches, including public health facilities, private practitioners,

traditional healers and self-treatment.[31,83] A qualitative study from 1999 on STI treatment seeking behaviors among Ugandan adults found that treatment in the informal sector, including self-treatment and traditional healers, was especially common (over 60% of participants). The study also found that for participants with STI-related symptoms, deterrents to seeking care at public health facilities included long waiting times, lack of drugs, user fees, corruption and bribes by health workers, health workers abusing STI patients, lack of privacy, long distances, fear of being tested for AIDS, specimens not being examined in the laboratory and being given tablets instead of injections (which were preferred).[31]

Other studies in SSA have identified a gender difference in treatment seeking: three studies in Kenya found women to be less likely to seek care than men mainly because symptoms were not considered severe, symptoms had disappeared, or as a result of lack of money.[38,39,84] One study found that because women were mostly monogamous, they did not relate their symptoms to sexual intercourse, which prevented them from promptly seeking care.[39] Age was also found to affect the timing of treatment seeking among women in the study, with younger women seeking less care than older women. A recent qualitative study on health care among women in rural Uganda found that the biggest concern for women was STI infection and barriers to seeking care included inaccessibility to facilities, lack of time and money, and dependence on men for permission to leave the home.[85] As a result, women coped by either ignoring their problem, using self-care or self-medication, using herbal or traditional medicine, or using

services in secret. Finally, a qualitative study assessing the pathway to cervical cancer diagnosis among Ugandan women reported that lay consultations with husbands, relatives and friends were common and influenced treatment seeking decisions and timing among women.[86] Prompt treatment seeking was triggered by symptoms that were perceived to be more severe or life threatening (e.g. heavy vaginal bleeding or lower abdominal pain), if the symptoms affected their routine work or if symptoms persisted even after home-remedies. Authors reported that late treatment seeking was due to symptoms being perceived as mild or normal, and attributed to a common illness that they could self-manage.

While useful in providing context, previous studies from low-resource settings, including those mentioned above, are limited in that many of them sampled participants at treatment facilities only after they presented for care; most studies do not capture individuals who delay seeking treatment or who do not seek treatment at all. This population-based study uses a population-based sample to describe treatment seeking behavior among adults with STI-related symptoms in rural Uganda and identify factors associated with seeking treatment at a clinic. The research questions are as follows:

1. What is the prevalence of treatment seeking among adults with STI-related symptoms?
2. What is the prevalence of treatment seeking at a government or private clinic?

3. Which sociodemographic and symptom-related factors are independently associated with treatment seeking at a government or private clinic?

4.3 Methods

Study Setting

This study was conducted as part of the STI prevalence study (STIPS), a population-based survey conducted in the Rakai region of South-central Uganda that aimed to estimate the STI burden in the area. The STIPS was conducted as a part of the Rakai Community Cohort Study (RCCS), one of the oldest population-based studies of HIV in SSA. Conducted by the Rakai Health Sciences Program (RHSP), the RCCS is an ongoing, open community-based cohort of residents aged 15-49 years in agrarian communities, semi-urban trading centers and Lake Victoria fishing communities in the Rakai region. The RCCS includes the administration of a demographic and health questionnaire, as well as HIV testing for all consenting participants. Details of the RCCS study design can be found elsewhere.[73]

The last estimation of STI burden in Rakai was conducted in the STD Control for HIV Prevention cluster randomized trial (1994-98).[75] The trial found that approximately 20% of the population were symptomatic.[74] Common STI symptoms among women included vaginal itching (15.4%), pelvic pain (14.7%), vaginal discharge (9.4%) and genital ulcer (5.5%); men reported genital ulcer (4.3%), dysuria (4.2%) and urethral discharge (1.7%). With regard to treatment seeking, the trial found that 56% of those with symptoms sought care (59.1% of

symptomatic men and 55.4% of symptomatic women).[74] More specifically, 67% sought treatment at a government or private clinic, while the rest used traditional healers or treated themselves. Women used traditional healers more than men (14.7% versus 5.1%), while men chose to treat themselves more than women (27.5% versus 11.3%).[74]

Data Collection

The STIPS was a population-based survey that recruited all individuals aged 18-49 years from two RCCS communities – one inland and one fishing – from May to October 2019. Three villages (Bitabago, Lumbugu, and Nsozibbiri) comprised the inland community and one (Ddimo) comprised the fishing community. In addition to the standard RCCS questionnaire, participants were administered an STI module that assessed their symptom status and treatment seeking behavior. To ascertain symptom status, each participant was prompted on a list of symptoms and asked to identify each symptom that they had experienced in the past six months (previous symptoms) and also in the past 7 days (recent symptoms). Symptoms included: genital ulcer, genital discharge, frequent urination, painful urination, pain during intercourse, bleeding during intercourse, lower abdominal pain and genital warts, as well as thick and/or colored vaginal discharge, itching of the vagina and unpleasant vaginal odor for women. If participants indicated ever experiencing symptoms, treatment seeking behavior was assessed. Participants were asked if they did anything to help cure those symptoms or to prevent passing on infection to their spouse or partner(s), and if

so, what action(s) did they take: used condoms, abstinence, sought treatment for self, sought treatment for partner or some other action. Those who reported seeking treatment for themselves were finally asked to specify where they went for treatment; the interviewer probed on the following items: pharmacy/drug store, market/shop, Rakai Program Clinic (RHSP clinic), government doctor/nurse/clinic, private doctor/nurse/clinic, traditional healer or other. Up to three locations were recorded, per participant.

In addition to the routine HIV screening conducted in the RCCS, STIPS participants were also evaluated for *Chlamydia trachomatis* (CT), *Neisseria gonorrhoeae* (NG), *Trichomonas vaginalis* (TV), syphilis and herpes simplex virus type 2 (HSV-2). All consenting participants provided genital swabs at the time of interview for testing (clinician-collected penile urethral meatus swabs for men and self-administered vaginal swabs for women). CT/NG testing was performed using the Abbott RealTime CT/NG assay using the Abbott m2000 RealTime System for PCR testing at the RHSP central laboratory. TV testing was performed using the OSOM Trichomonas Rapid Test (Sekisui) at the time of the survey. Syphilis screening was performed using the SD Bioline 3.0, a solid phase immunochromatographic assay for the qualitative detection of antibodies of all isotypes (IgG, IgM, IgA) against T. pallidum. Syphilis screening was performed with HIV testing at time of survey; the rapid plasma reagin test (RPR) was then performed within 24 hours at the RHSP central laboratory for all participants with positive screening results to determine syphilis titers. HSV-2 testing was

performed using routinely collected sera the after collection of all STIPS samples. Testing was performed at the RHSP central laboratory using the Kalon HSV-2 gG2 ELISA (Kalon Biologicals Ltd. Guildford, UK). The assay was performed manually; optical densities (OD) were read using a Bio-Tek ELx 800 microplate reader. All assays were conducted according to the manufacturers' protocol. All individuals who tested positive for any STI were provided treatment by RHSP per the Ugandan National Clinical Treatment Guidelines for STIs.

Data Analysis

To begin, we estimated the overall prevalence of STI-related symptoms among all STIPS participants. For the rest of the analysis, we restricted our sample to only those who reported any STI-related symptoms in the past six months (n=962). First, we presented descriptive data for the sample, including the prevalence of various symptoms. Second, we estimated the prevalence of any treatment seeking (defined as self-reported treatment seeking from any location for STI-related symptoms in the past six months) for the sample, as well as each gender and community type. Modified Poisson regression with robust variance allow for direct estimation of prevalence ratios in cross-sectional data;[87] we used univariable modified Poisson regressions with robust variance to compare the prevalence of any treatment seeking between genders and between community types, as well as between gender-specific community strata. Third, we estimated the prevalence of treatment seeking at each treatment location (e.g. government clinic, private clinic, pharmacy/drug store, etc.) and used univariable modified

Poisson regressions with robust variance to compare the prevalence of private versus government clinic treatment seeking between genders, community types, and gender-specific community strata. Fourth, we estimated the prevalence of seeking treatment at a clinic for the full sample, as well as each gender and community type. For this, we compared participants who sought treatment at a government or private clinic (clinic) to those who did not (no clinic). Included among those who did not seek clinic treatment were those who sought treatment at a non-clinic location (e.g. pharmacy/drug store, market/shop, traditional healer, etc.), as well as those who sought no treatment at all. Again, we used univariable modified Poisson regressions with robust variance to compare the prevalence clinic treatment seeking between genders, community types, and gender-specific community strata. Fifth, we used multivariable modified Poisson regressions with robust variance to determine sociodemographic and symptom-related factors independently associated with seeking clinic treatment, for each gender. Finally, for each gender, we estimated the prevalence of any curable STI (NG, CT, TV or active syphilis) at the time of the survey among those who did, and did not, previously seek clinic treatment. We used modified Poisson regressions with robust variance to compare these estimates and explore the univariable association between previous clinic treatment seeking and current prevalence of curable STIs, for each gender.

Complete treatment seeking information (i.e. any treatment seeking [yes or no] and specific treatment location) was collected for 99.4% of the sample, with only

6 participants dropped from the analysis because of missing treatment data. Considering the different social and economic contexts of men and women, we conducted analyses for the sample as a whole, as well as for each gender separately. We also stratified data for each gender by community type to assess for differences between same-gender participants in fishing and inland communities. Age in years was analyzed in five year age groupings. We also calculated the number of symptoms in the past week, and in the past six months, as a sum of a participant's self-reported symptoms in the respective time period. For all analyses, the RHSP clinic was classified as a private clinic. We assessed positive STI diagnoses with the STIPS test result, with syphilis RPR titers ≥8 considered indicative of active syphilis infection and an index value of ≥1.5 indicative of a positive HSV-2 test.[88]

We used prior information from the literature to critically evaluate and select variables for inclusion in the final multivariable models. Based on a conceptual framework of treatment seeking behavior,[5] we included in our model the number of STI-related symptoms experienced in the past six months, as well as select sociodemographic characteristics (age, community type, marital status, HIV status) that could theoretically affect treatment seeking behavior. All data analysis was carried out in STATA version 15.[77]

4.4 Results

Sociodemographic characteristics, sexual behavior and STI symptomatology

Fifty-three percent (962/1,825) of adults reported any STI symptoms in the six months prior to the STIPS interview date (34% [290/860] of males; 70% [672/964] of females). Sixty-three percent (605/962) of those with symptoms reported at least one symptom in the past seven days (51% [149/290] of males; 68% [456/672] of females). Table 2 summarizes the demographic characteristics of the study group. Most men were aged 30-39 years, in a monogamous marriage, from the fishing community, Christian, educated at some level and working in the fishing industry. Most women were aged 20-29 years, in a monogamous marriage, from the fishing community, Christian, having some education and working in agricultural or housework. Approximately one-third of the study sample were people living with HIV. With respect to sexual behaviors, approximately half of the men in the sample had 2-4 sexual partners in the past year (148 [51%]) with the majority reporting 5-10 sexual partners in their lifetime (205 [71%]). Over three-quarters of women in the sample reported having one sexual partner in the past year (529 [79%]) and just over half of women reported 2-4 lifetime sexual partners (408 [61%]). For unmarried men, the majority reported inconsistent condom use in the past year (48/87 [55%]) while the majority of unmarried women reported never using a condom (90/158 [57%]).

Table 2. Sociodemographic characteristics and symptomatology of STIPS participants who reported STI symptoms in the past 6 months (N=962), by gender. Data are presented as n (%).

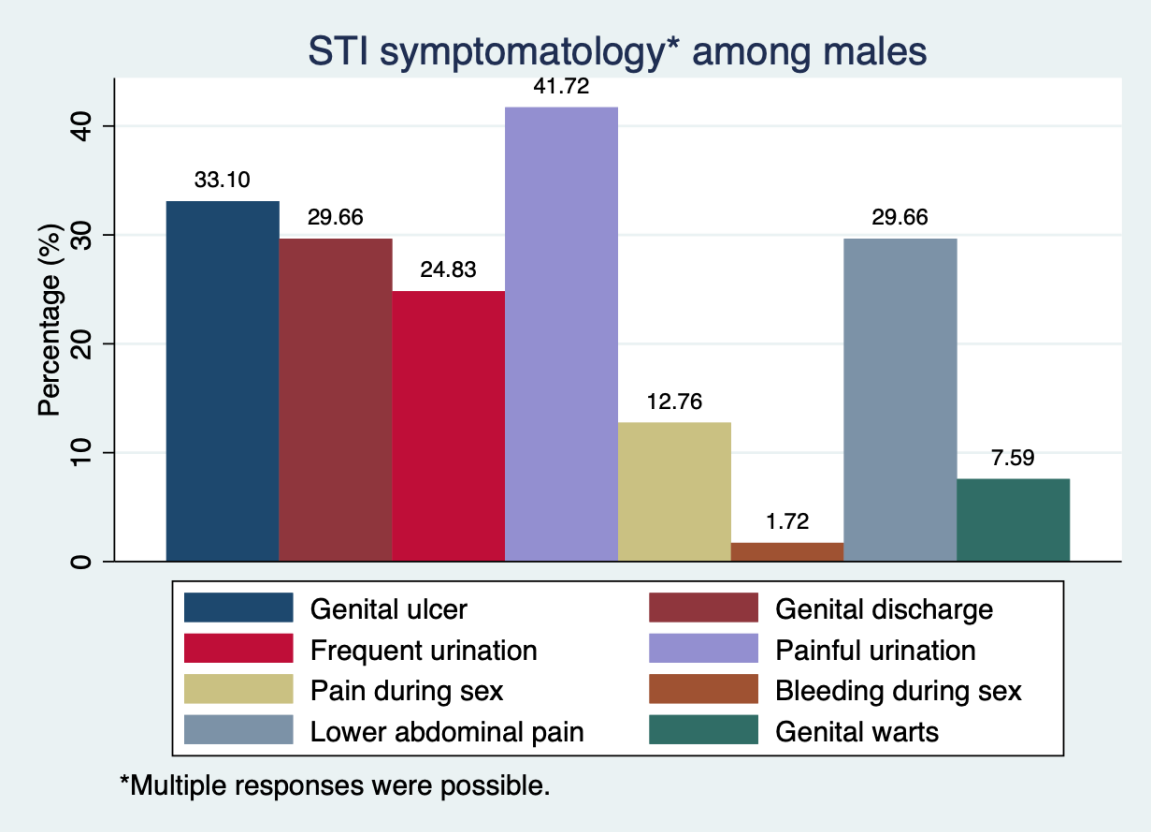
	Total N=962	Male N=290	Female N=672
Age			
15-19 years	69 (7%)	14 (5%)	55 (8%)
20-29 years	371 (39%)	98 (34%)	273 (41%)

30-39 years	356 (37%)	115 (40%)	241 (36%)
40-49 years	166 (17%)	63 (22%)	103 (15%)
Marital status			
Never Married	75 (8%)	33 (11%)	42 (6%)
Married, Monogamous	560 (58%)	174 (60%)	386 (57%)
Married, Polygamous	128 (13%)	23 (8%)	105 (16%)
Previously Married	199 (21%)	60 (21%)	139 (21%)
Community type			
Inland	420 (44%)	96 (33%)	324 (48%)
Fishing	542 (56%)	194 (67%)	348 (52%)
Religion (N=935)			
Christian	806 (86%)	244 (84%)	562 (87%)
Muslim	123 (13%)	45 (16%)	78 (12%)
Other/none	6 (1%)	1 (0%)	5 (1%)
Education			
No	62 (6%)	21 (7%)	41 (6%)
Yes	900 (94%)	269 (93%)	631 (94%)
Occupation			
Agricultural or housework	342 (36%)	50 (17%)	292 (43%)
Bar or restaurant work	71 (7%)	1 (0%)	70 (10%)
Boda boda driving or trucking	20 (2%)	20 (7%)	0 (0%)
Fishing	128 (13%)	128 (44%)	0 (0%)
Student	12 (1%)	4 (1%)	8 (1%)
Trader or shopkeeper	220 (23%)	36 (12%)	184 (27%)
Other	169 (18%)	51 (18%)	118 (18%)
HIV status (N=960)			
Negative	649 (68%)	200 (69%)	449 (67%)
Positive	311 (32%)	90 (31%)	221 (33%)
Sex in the past year			
No	55 (6%)	9 (3%)	46 (7%)
Yes	907 (94%)	281 (97%)	626 (93%)
Sexual partners in the past year			
None	55 (6%)	9 (3%)	46 (7%)
1	631 (66%)	102 (35%)	529 (79%)
2-4	243 (25%)	148 (51%)	95 (14%)
5-10	25 (3%)	24 (8%)	1 (0%)
>10	8 (1%)	7 (2%)	1 (0%)
Sex with partner from outside the community			
No	711 (74%)	162 (56%)	549 (82%)
Yes	251 (26%)	128 (44%)	123 (18%)
Lifetime sexual partners			
None	10 (1%)	2 (1%)	8 (1%)
1	77 (8%)	1 (0%)	76 (11%)
2-4	460 (48%)	52 (18%)	408 (61%)
5-10	376 (39%)	205 (71%)	171 (25%)
>10	39 (4%)	30 (10%)	9 (1%)
Condom use in past 12 months by marital status			
Married	688 (72%)	197 (68%)	491 (73%)
Not married, never used condoms	120 (12%)	30 (10%)	90 (13%)
Not married, sometimes/inconsistent use	103 (11%)	48 (17%)	55 (8%)
Not married, always used condoms	22 (2%)	9 (3%)	13 (2%)
NA, no sex	29 (3%)	6 (2%)	23 (3%)
Symptoms in the past 7 days			
No	357 (37%)	141 (49%)	216 (32%)
Yes	605 (63%)	149 (51%)	456 (68%)

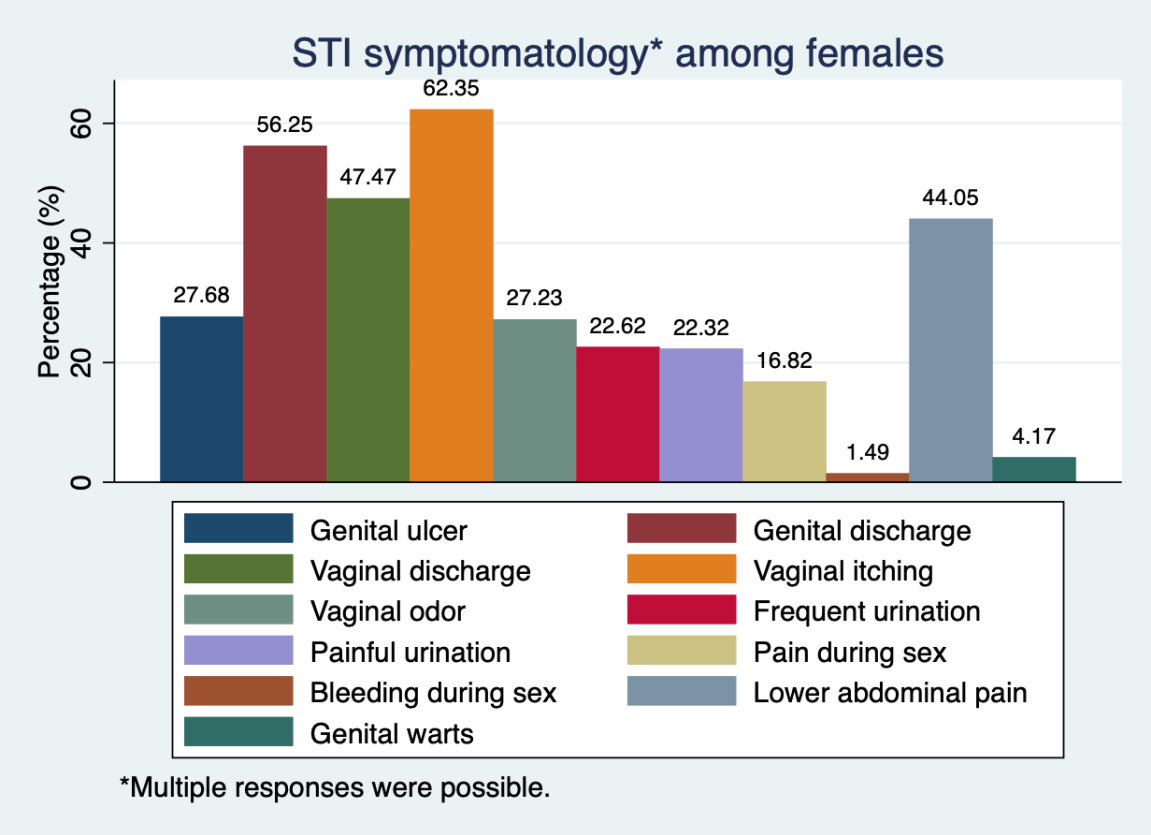
Number of STI symptoms in past 6 months			
1	313 (33%)	161 (56%)	152 (23%)
2-4	462 (48%)	120 (41%)	342 (51%)
>=5	187 (19%)	9 (3%)	178 (26%)
Number of STI symptoms in past 7 days			
0	357 (37%)	141 (49%)	216 (32%)
1	261 (27%)	101 (35%)	160 (24%)
2-4	250 (26%)	42 (14%)	208 (31%)
>=5	94 (10%)	6 (2%)	88 (13%)

In terms of symptoms, the majority of men reported only one symptom (161 [56%]) in the past six months, with painful urination being the most common (42%). The majority of women reported 2-4 symptoms (342 [51%]) in the past six months, with vaginal itching being the most common (62%) (Figure 4). Half (149 [51%]) of men reported experiencing symptoms in the seven days before the interview as compared to 68% (456) of women. Of those who reported symptoms in the past seven days, most men reported one symptom in the past week (101 of 149 [68%]) and most women reported 2-4 symptoms in the past week (208/456 [46%]).

Figure 4. Symptomatology of STIPS participants who reported STI-related symptoms in past 6 months (N=962), by gender


STI symptomatology* among males
Percentage (%)
0
10
20
30
40
33.10
29.66
24.83
41.72
12.76
1.72
29.66
7.59
Genital ulcer
Frequent urination
Pain during sex
Lower abdominal pain
Genital discharge
Painful urination
Bleeding during sex
Genital warts
*Multiple responses were possible.

A – Males



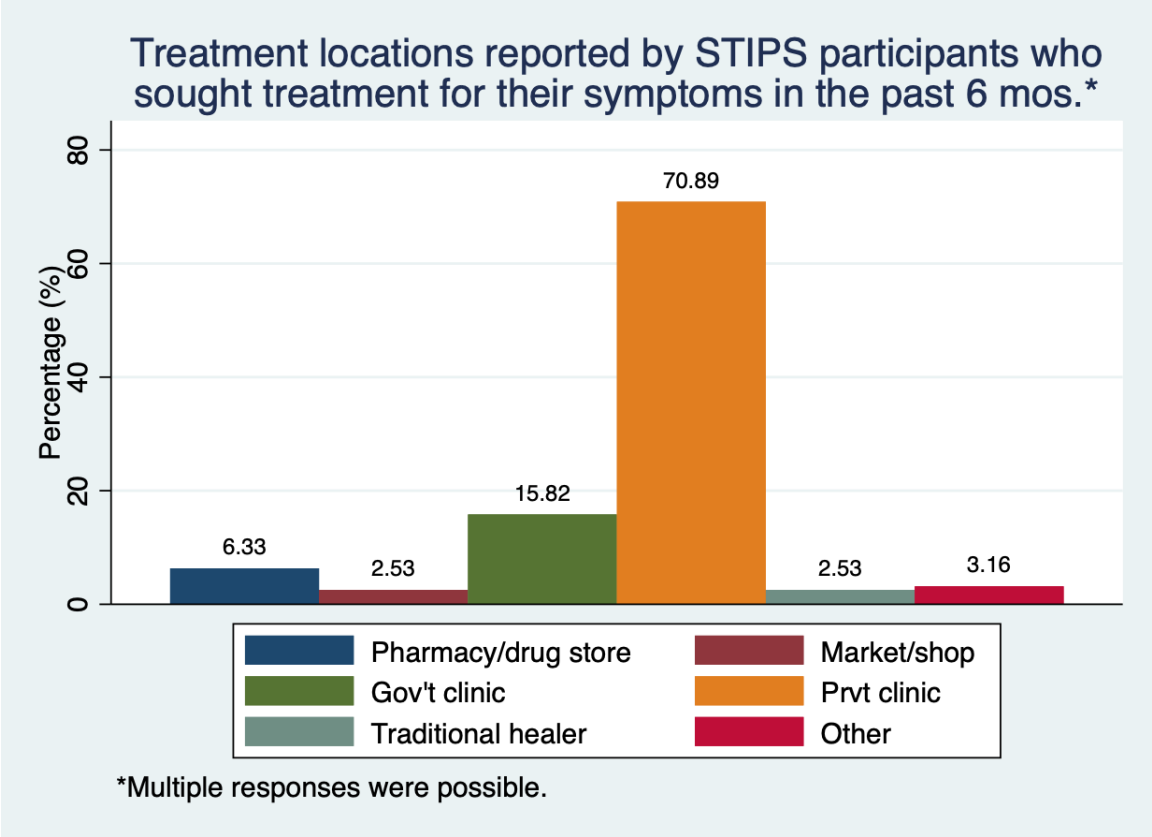
B – Females

Treatment seeking for STI symptoms

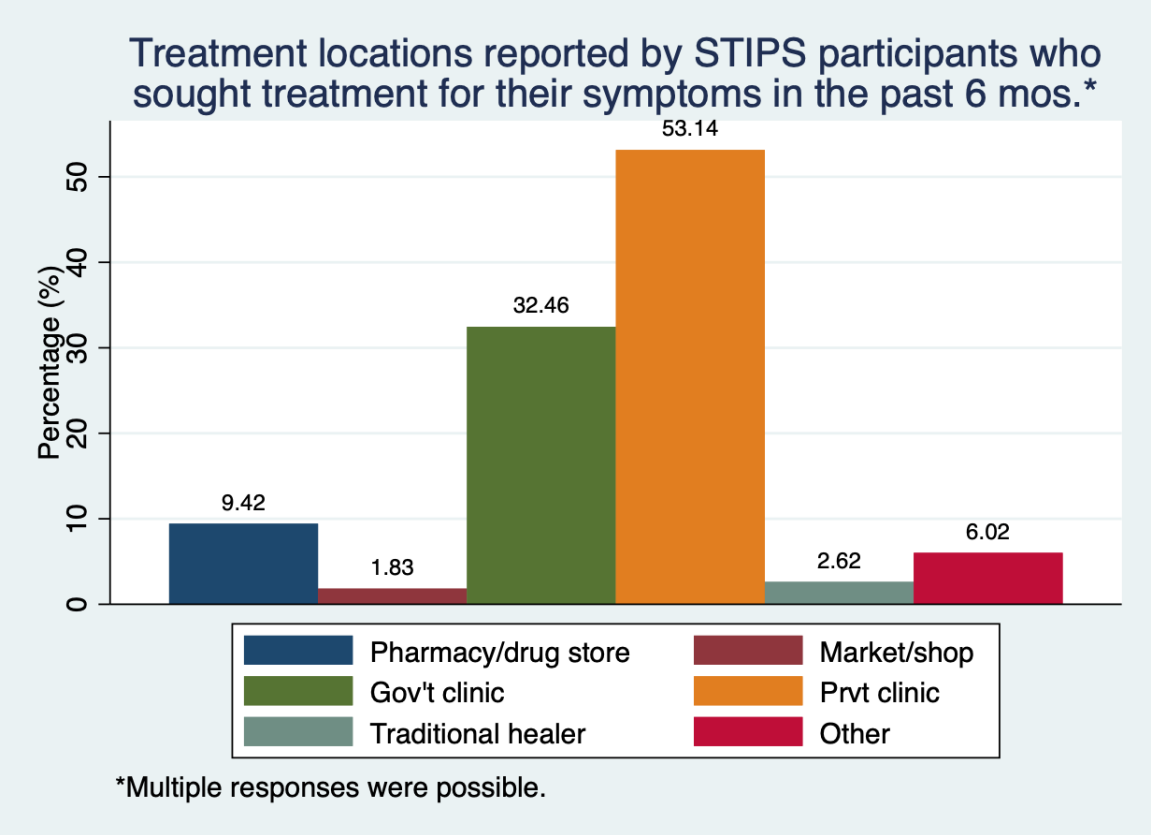
Overall, 545 participants (57%) reported seeking any treatment for their symptoms, while the remaining 43% reported seeking no treatment at all. The likelihood of seeking any treatment was similar between men and women (160/290 [55%] males; 385/671 [57%] females; PRR: 1.04, 95% CI: 0.92-1.18). The prevalence of seeking any treatment also did not differ by community type (PRR: 1.04, 95% CI: 0.93-1.16). No significant differences were observed when further stratifying by gender and community type.

Figure 5 shows where participants sought treatment for their symptoms. Nearly all participants (95%, 515/541) who sought treatment did so at only one location, while 5% (26/541) reported seeking treatment at two locations. Of those who sought treatment, 58% sought treatment at a private clinic, 28% at a government clinic, 9% at a pharmacy/drug store, 3% at a traditional healer, 2% at a market/shop, and 5% at some other location. Private clinics were the most common treatment location among both genders (71% among males; 53% among females). RHSP clinics comprised 7% of all private clinic visits. Comparing private and government clinics, women were less likely to seek treatment at private clinics (more likely to seek government clinics) than men (PRR: 0.76, 95% CI: 0.68-0.85). This trend was seen in both the fishing (PRR: 0.86, 95% CI: 0.76-0.96) and inland (PRR: 0.65, 95% CI: 0.51-0.83) communities. When comparing men across communities, men in fishing communities were significantly more likely to seek treatment at a private clinic than men in inland communities (PRR: 1.25, 95% CI: 1.04-1.51). Similarly, women in the fishing community were significantly more likely to seek treatment at private clinics than women in the inland community (PRR: 1.65, 95% CI: 1.36-2.01).

Figure 5. Treatment locations reported by STIPS participants who sought treatment for their symptoms in the past 6 months (N=545)


Treatment locations reported by STIPS participants who sought treatment for their symptoms in the past 6 mos.*
Percentage (%)
0
20
40
60
80
6.33
2.53
15.82
70.89
2.53
3.16
Pharmacy/drug store
Market/shop
Gov't clinic
Prvt clinic
Traditional healer
Other
*Multiple responses were possible.

A- Males



B – Females

Treatment seeking at a clinic

A total of 457 participants (48%) reported seeking treatment at a clinic (government or private) for their symptoms. There was no difference in the prevalence of clinic treatment by gender (47% males; 48% females; PRR: 1.02, 95% CI: 0.88-1.18) or by community type (48% inland; 47% fishing; PRR: 0.98, 95% CI: 0.78-0.86) When stratifying each gender by community type, however, we found that men in the fishing community were significantly less likely to seek clinic treatment than men in the inland community (43% men in inland; 55% men in fishing; PRR: 0.78, 95% CI: 0.61-1.00).

Full descriptive data of clinic treatment seekers can be found in Table 3. Overall, of those men who sought clinic treatment, most were aged 20-39 years; married in a monogamous union; and/or working in the fishing industry. Of those women who sought clinic treatment, most were aged 20-29 years; married in a monogamous union; and/or engaged in agriculture or housework. Thirty-three percent of men and 35% of women who sought treatment at a clinic were HIV-positive. With respect to STI symptomatology, painful urination (52%), genital discharge (47%) and genital ulcers (35%) were the most common symptoms reported among men who sought treatment at a clinic. Vaginal itching (69%), genital discharge (57%) and vaginal discharge (50%) were the most frequently reported symptoms among women who sought clinic treatment. About half of men who reported seeking treatment at a clinic reported 2-4 STI symptoms in the past six months (73/136 [54%]). This was similar for women (157/321 [49%]).

Just over half of men who reported seeking care at a clinic for their symptoms reported no symptoms in the past week (73/136 [54%]). In contrast, the majority of women who reported seeking care at a clinic for their symptoms reported having at least one STI symptom in the past week (66%), with 65/321 [20%] reporting one symptom 97/321, [30%] reporting 2-4 symptoms and 49/321 [15%] reporting five or more symptoms. When considering only those who reported at least one symptom in the past week, we saw that, for both men and women, just over half reported that they did not seek treatment at a clinic in the past six months for their symptoms (85/148 [57%] and 244/455 [54%], respectively). We

found no significant differences in any of these associations when we further stratified our gender-stratified analyses by community type.

Table 3 describes the univariable associations between sociodemographic characteristics, sexual behaviors, and STI symptomatology with clinic treatment for the full sample, as well as for men and women. Women were more likely to seek clinic treatment if they were in a polygamous marriage (PRR: 1.64, 95% CI: 1.01-2.66) and less likely to seek treatment if they had no sexual partners in the past year (PRR: 0.59, 95% CI: 0.37-0.94). Condom use, the number of STI symptoms reported in the past six months and the number of STI symptoms reported in the past week were also associated with clinic treatment seeking for both men and women. Certain symptoms also showed univariable associations with clinic treatment seeking for each gender. For men, the likelihood of seeking treatment in a clinic increased with reporting of painful urination in the past six months (PRR: 1.55, 95% CI: 1.22-1.98) and more than doubled with reporting of genital discharge (PRR: 2.16, 95% CI: 1.73-2.69). However, the likelihood for seeking clinic care decreased with reporting of genital warts (PRR: 0.46, 95% CI: 0.21-1.01). For women, self-reported genital ulcer (PRR: 1.44, 95% CI: 1.23-1.68), vaginal itching (PRR: 1.33, 95% CI: 1.11-1.59) frequent urination (PRR: 1.28, 95% CI: 1.09-1.51), painful urination (PRR: 1.54, 95% CI: 1.32-1.79), pain during intercourse (PRR: 1.27, 95% CI: 1.06-1.52) and lower abdominal pain (PRR: 1.22, 95% CI: 1.04-1.42) in the past six months were each associated with an increased likelihood of seeking care at a clinic. We found no significant

differences in any of these associations when we further stratified our gender-stratified analyses by community type.

Table 3. Crude prevalence of clinic treatment seeking among STIPS participants who reported STI symptoms in the past 6 months (N=956), for the full sample and by gender. Data are presented as n (%).

A – Full Sample

	FULL SAMPLE (N=956)		
	No clinic N=499	**Clinic N=457**	**Crude PRR (95% CI)**
Gender			
Male	152/288 (53%)	136/288 (47%)	REF
Female	347/668 (52%)	321/668 (48%)	1.02 (0.88-1.18)
Age			
15-19 years	39/69 (57%)	30/69 (43%)	REF
20-29 years	182/368 (49%)	186/368 (51%)	1.16 (0.87-1.55)
30-39 years	184/355 (52%)	171/355 (48%)	1.11 (0.83-1.48)
40-49 years	94/164 (57%)	70/164 (43%)	0.98 (0.71-1.36)
Marital status			
Never Married	43/73 (59%)	30/73 (41%)	REF
Married, Monogamous	296/558 (53%)	262/558 (47%)	1.14 (0.86-1.52)
Married, Polygamous	63/127 (50%)	64/127 (50%)	1.23 (0.89-1.70)
Previously Married	97/198 (49%)	101/198 (51%)	1.24 (0.91-1.69)
Community type			
Inland	216/418 (52%)	202/418 (48%)	REF
Fishing	283/538 (53%)	255/538 (47%)	0.98 (0.86-1.12)
Religion			
Christian	414/802 (52%)	388/802 (48%)	REF
Muslim	65/122 (53%)	57/122 (47%)	0.97 (0.79-1.18)
Other/none	3/6 (50%)	3/6 (50%)	1.03 (0.46-2.31)
Education			
No	37/62 (60%)	25/62 (40%)	REF
Yes	462/894 (52%)	432/894 (48%)	1.20 (0.88-1.63)
Occupation			
Agricultural or housework	177/342 (52%)	165/342 (48%)	REF
Bar or restaurant work	38/70 (54%)	32/70 (46%)	0.95 (0.72-1.25)
Boda boda driving or trucking	10/19 (53%)	9/19 (47%)	0.98 (0.60-1.60)
Fishing	76/127 (60%)	51/127 (40%)	0.83 (0.66-1.06)
Student	7/12 (58%)	5/12 (42%)	0.86 (0.44-1.70)
Trader or shopkeeper	113/219 (52%)	106/219 (48%)	1.00 (0.84-1.20)
Other	78/167 (47%)	89/167 (53%)	1.10 (0.92-1.32)
HIV status			
Negative	347/645 (54%)	298/645 (46%)	REF
Positive	152/309 (49%)	157/309 (51%)	1.10 (0.96-1.26)
Sex in the past year			
No	36/54 (67%)	18/54 (33%)	REF
Yes	463/902 (51%)	439/902 (49%)	1.46** (1.00-2.14)
Sexual partners in the past year			

None	36/54 (67%)	18/54 (33%)	0.68** (0.47-1.01)
1	322/628 (51%)	306/628 (49%)	REF
2-4	127/242 (52%)	115/242 (48%)	0.98 (0.84-1.14)
5-10	11/24 (46%)	13/24 (54%)	1.11 (0.76-1.62)
>10	3/8 (38%)	5/8 (62%)	1.28 (0.75-2.21)
Sex with partner from outside the community			
No	365/708 (52%)	343/708 (48%)	REF
Yes	134/248 (54%)	114/248 (46%)	0.95 (0.81-1.11)
Lifetime sexual partners			
None	9/10 (90%)	1/10 (10%)	0.21* (0.03-1.37)
1	45/77 (58%)	32/77 (42%)	0.88 (0.66-1.17)
2-4	242/458 (53%)	216/458 (47%)	REF
5-10	180/372 (48%)	192/372 (52%)	1.09 (0.95-1.26)
>10	23/39 (59%)	16/39 (41%)	0.87 (0.59-1.28)
Condom use in past 12 months by marital status			
Married	359/685 (52%)	326/685 (48%)	REF
Not married, never	67/119 (56%)	52/119 (44%)	0.92 (0.74-1.14)
Not married, sometimes/inconsistent	38/101 (38%)	63/101 (62%)	1.31*** (1.10-1.55)
Not married, always	12/22 (55%)	10/22 (45%)	0.96 (0.60-1.52)
NA, no sex	23/29 (79%)	6/29 (21%)	0.43** (0.21-0.89)
Symptoms in the past 7 days			
No	170/353 (48%)	183/353 (52%)	REF
Yes	329/603 (55%)	274/603 (45%)	0.88** (0.77-1.00)
Number of STI symptoms in past 6 months			
1	200/312 (64%)	112/312 (36%)	REF
2-4	227/457 (50%)	230/457 (50%)	1.40*** (1.18-1.67)
>=5	72/187 (39%)	115/187 (61%)	1.71*** (1.42-2.06)
Number of STI symptoms in past 7 days			
0	170/353 (48%)	183/353 (52%)	REF
1	160/260 (62%)	100/260 (38%)	0.74*** (0.62-0.89)
2-4	128/249 (51%)	121/249 (49%)	0.94 (0.80-1.10)
>=5	41/94 (44%)	53/94 (56%)	1.09 (0.89-1.33)
Genital ulcer			
No	380/675 (56%)	295/675 (44%)	REF
Yes	119/281 (42%)	162/281 (58%)	1.32*** (1.16-1.51)
Genital discharge			
No	285/495 (58%)	210/495 (42%)	REF
Yes	214/461 (46%)	247/461 (54%)	1.26*** (1.11-1.44)
Thick and/or colored vaginal discharge			
No	342/638 (54%)	296/638 (46%)	REF
Yes	157/318 (49%)	161/318 (51%)	1.09 (0.95-1.25)
Itching of the vagina			
No	303/539 (56%)	236/539 (44%)	REF
Yes	196/417 (47%)	221/417 (53%)	1.21*** (1.06-1.38)
Unpleasant vaginal odor			
No	411/774 (53%)	363/774 (47%)	REF
Yes	88/182 (48%)	94/182 (52%)	1.10 (0.94-1.29)
Frequent urination			
No	390/733 (53%)	343/733 (47%)	REF
Yes	109/223 (49%)	114/223 (51%)	1.09 (0.94-1.27)

Painful urination			
No	400/687 (58%)	287/687 (42%)	REF
Yes	99/269 (37%)	170/269 (63%)	1.51*** (1.33-1.72)
Pain during intercourse			
No	436/806 (54%)	370/806 (46%)	REF
Yes	63/150 (42%)	87/150 (58%)	1.26*** (1.08-1.48)
Bleeding during intercourse			
No	488/941 (52%)	453/941 (48%)	REF
Yes	11/15 (73%)	4/15 (27%)	0.55 (0.24-1.29)
Lower abdominal pain			
No	318/577 (55%)	259/577 (45%)	REF
Yes	181/379 (48%)	198/379 (52%)	1.16** (1.02-1.33)
Genital warts			
No	463/906 (51%)	443/906 (49%)	REF
Yes	36/50 (72%)	14/50 (28%)	0.57** (0.37-0.90)

*** p≤0.01, ** p≤0.05, * p≤0.1

B – Males

	MALES (N=288)		
	No clinic N=152	**Clinic N=136**	**Crude PRR (95% CI)**
Age			
15-19 years	8/14 (57%)	6/14 (43%)	REF
20-29 years	45/97 (46%)	52/97 (54%)	1.25 (0.66-2.36)
30-39 years	62/114 (54%)	52/114 (46%)	1.06 (0.56-2.02)
40-49 years	37/63 (59%)	26/63 (41%)	0.96 (0.49-1.89)
Marital status			
Never Married	15/32 (47%)	17/32 (53%)	REF
Married, Monogamous	102/173 (59%)	71/173 (41%)	0.77 (0.53-1.12)
Married, Polygamous	13/23 (57%)	10/23 (43%)	0.82 (0.46-1.45)
Previously Married	22/60 (37%)	38/60 (63%)	1.19 (0.82-1.74)
Community type			
Inland	43/96 (45%)	53/96 (55%)	REF
Fishing	109/192 (57%)	83/192 (43%)	0.78** (0.61-1.00)
Religion			
Christian	123/242 (51%)	119/242 (49%)	REF
Muslim	29/45 (64%)	16/45 (36%)	0.72 (0.48-1.09)
Other/none	0/1 (0%)	1/1 (100%)	2.03*** (1.79-2.31)
Education			
No	11/21 (52%)	10/21 (48%)	REF
Yes	141/267 (53%)	126/267 (47%)	0.99 (0.62-1.58)
Occupation			
Agricultural or housework	21/50 (42%)	29/50 (58%)	REF
Bar or restaurant work	1/1 (100%)	0/1 (0%)	-
Boda boda driving or trucking	10/19 (53%)	9/19 (47%)	0.82 (0.48-1.39)
Fishing	76/127 (60%)	51/127 (40%)	0.69** (0.50-0.95)
Student	2/4 (50%)	2/4 (50%)	0.86 (0.31-2.37)
Trader or shopkeeper	19/36 (53%)	17/36 (47%)	0.81 (0.54-1.24)
Other	23/51 (45%)	28/51 (55%)	0.95 (0.67-1.33)
HIV status			
Negative	108/199 (54%)	91/199 (46%)	REF
Positive	44/89 (49%)	45/89 (51%)	1.11 (0.86-1.43)
Sex in the past year			
No	4/9 (44%)	5/9 (56%)	REF

Yes	148/279 (53%)	131/279 (47%)	0.85 (0.46-1.54)
Sexual partners in the past year			
None	4/9 (44%)	5/9 (56%)	1.21 (0.65-2.25)
1	55/102 (54%)	47/102 (46%)	REF
2-4	79/147 (54%)	68/147 (46%)	1.00 (0.76-1.32)
5-10	11/23 (48%)	12/23 (52%)	1.13 (0.73-1.77)
>10	3/7 (43%)	4/7 (57%)	1.24 (0.63-2.44)
Sex with partner from outside the community			
No	86/162 (53%)	76/162 (47%)	REF
Yes	66/126 (52%)	60/126 (48%)	1.02 (0.79-1.30)
Lifetime sexual partners			
None	2/2 (100%)	0/2 (0%)	-
1	0/1 (0%)	1/1 (100%)	2.26*** (1.67-3.07)
2-4	29/52 (56%)	23/52 (44%)	REF
5-10	104/203 (51%)	99/203 (49%)	1.10 (0.79-1.54)
>10	17/30 (57%)	13/30 (43%)	0.98 (0.59-1.63)
Condom use in past 12 months by marital status			
Married	115/196 (59%)	81/196 (41%)	REF
Not married, never	13/30 (43%)	17/30 (57%)	1.37* (0.96-1.96)
Not married, sometimes/inconsistent	14/47 (30%)	33/47 (70%)	1.70*** (1.32-2.18)
Not married, always	6/9 (67%)	3/9 (33%)	0.81 (0.31-2.07)
NA, no sex	4/6 (67%)	2/6 (33%)	0.81 (0.26-2.54)
Symptoms in the past 7 days			
No	67/140 (48%)	73/140 (52%)	REF
Yes	85/148 (57%)	63/148 (43%)	0.82 (0.64-1.04)
Number of STI symptoms in past 6 months			
1	103/161 (64%)	58/161 (36%)	REF
2-4	45/118 (38%)	73/118 (62%)	1.72 (1.34-2.21)
>=5	4/9 (44%)	5/9 (56%)	1.54 (0.83-2.87)
Number of STI symptoms in past 7 days			
0	67/140 (48%)	73/140 (52%)	REF
1	65/100 (65%)	35/100 (35%)	0.67*** (0.49-0.92)
2-4	18/42 (43%)	24/42 (57%)	1.10 (0.81-1.49)
>=5	2/6 (33%)	4/6 (67%)	1.28 (0.71-2.30)
Genital ulcer			
No	104/192 (54%)	88/192 (46%)	REF
Yes	48/96 (50%)	48/96 (50%)	1.09 (0.85-1.40)
Genital discharge			
No	132/204 (65%)	72/204 (35%)	REF
Yes	20/84 (24%)	64/84 (76%)	2.16 (1.73-2.69)
Frequent urination			
No	107/217 (49%)	110/217 (51%)	REF
Yes	45/71 (63%)	26/71 (37%)	0.72* (0.52-1.01)
Painful urination			
No	104/169 (62%)	65/169 (38%)	REF
Yes	48/119 (40%)	71/119 (60%)	1.55*** (1.22-1.98)
Pain during intercourse			
No	136/251 (54%)	115/251 (46%)	REF
Yes	16/37 (43%)	21/37 (57%)	1.24 (0.91-1.69)
Bleeding during intercourse			
No	149/283 (53%)	134/283 (47%)	REF

Yes	3/5 (60%)	2/5 (40%)	0.84 (0.29-2.49)
Lower abdominal pain			
No	108/203 (53%)	95/203 (47%)	REF
Yes	44/85 (52%)	41/85 (48%)	1.03 (0.79-1.34)
Genital warts			
No	135/266 (51%)	131/266 (49%)	REF
Yes	17/22 (77%)	5/22 (23%)	0.46*** (0.21-1.01)

*** p≤0.01, ** p≤0.05, * p≤0.1

C – Females

	FEMALES (N=668)		
	No clinic N=347	**Clinic N=321**	**Crude PRR (95% CI)**
Age			
15-19 years	31/55 (56%)	24/55 (44%)	REF
20-29 years	137/271 (51%)	134/271 (49%)	1.13 (0.82-1.57)
30-39 years	122/241 (51%)	119/241 (49%)	1.13 (0.82-1.57)
40-49 years	57/101 (56%)	44/101 (44%)	1.00 (0.69-1.45)
Marital status			
Never Married	28/41 (68%)	13/41 (32%)	REF
Married, Monogamous	194/385 (50%)	191/385 (50%)	1.56* (0.99-2.48)
Married, Polygamous	50/104 (48%)	54/104 (52%)	1.64** (1.01-2.66)
Previously Married	75/138 (54%)	63/138 (46%)	1.44 (0.89-2.34)
Community type			
Inland	173/322 (54%)	149/322 (46%)	REF
Fishing	174/346 (50%)	172/346 (50%)	1.07 (0.92-1.26)
Religion			
Christian	291/560 (52%)	269/560 (48%)	REF
Muslim	36/77 (47%)	41/77 (53%)	1.11 (0.88-1.39)
Other/none	3/5 (60%)	2/5 (40%)	0.83 (0.28-2.45)
Education			
No	26/41 (63%)	15/41 (37%)	REF
Yes	321/627 (51%)	306/627 (49%)	1.33 (0.88-2.01)
Occupation			
Agricultural or housework	156/292 (53%)	136/292 (47%)	REF
Bar or restaurant work	37/69 (54%)	32/69 (46%)	1.00 (0.75-1.32)
Boda boda driving or trucking	0/0 (0%)	0/0 (0%)	-
Fishing	0/0 (0%)	0/0 (0%)	-
Student	5/8 (62%)	3/8 (38%)	0.81 (0.33-1.99)
Trader or shopkeeper	94/183 (51%)	89/183 (49%)	1.04 (0.86-1.27)
Other	55/116 (47%)	61/116 (53%)	1.13 (0.91-1.40)
HIV status			
Negative	239/446 (54%)	207/446 (46%)	REF
Positive	108/220 (49%)	112/220 (51%)	1.10 (0.93-1.29)
Sex in the past year			
No	32/45 (71%)	13/45 (29%)	REF
Yes	315/623 (51%)	308/623 (49%)	1.71** (1.07-2.73)
Sexual partners in the past year			
None	32/45 (71%)	13/45 (29%)	0.59** (0.37-0.94)
1	267/526 (51%)	259/526 (49%)	REF
2-4	48/95 (51%)	47/95 (49%)	1.00 (0.81-1.25)
5-10	0/1 (0%)	1/1 (100%)	2.03*** (1.86-2.22)
>10	0/1 (0%)	1/1 (100%)	2.03*** (1.86-2.22)

Sex with partner from outside the community			
No	279/546 (51%)	267/546 (49%)	REF
Yes	68/122 (56%)	54/122 (44%)	0.91 (0.73-1.12)
Lifetime sexual partners			
None	7/8 (88%)	1/8 (12%)	0.26 (0.04-1.65)
1	45/76 (59%)	31/76 (41%)	0.86 (0.64-1.15)
2-4	213/406 (52%)	193/406 (48%)	REF
5-10	76/169 (45%)	93/169 (55%)	1.16* (0.98-1.37)
>10	6/9 (67%)	3/9 (33%)	0.70 (0.28-1.78)
Condom use in past 12 months by marital status			
Married	244/489 (50%)	245/489 (50%)	REF
Not married, never	54/89 (61%)	35/89 (39%)	0.78* (0.60-1.03)
Not married, sometimes/inconsistent	24/54 (44%)	30/54 (56%)	1.11 (0.86-1.43)
Not married, always	6/13 (46%)	7/13 (54%)	1.07 (0.64-1.79)
NA, no sex	19/23 (83%)	4/23 (17%)	0.35** (0.14-0.85)
Symptoms in the past 7 days			
No	103/213 (48%)	110/213 (52%)	REF
Yes	244/455 (54%)	211/455 (46%)	0.90 (0.76-1.06)
Number of STI symptoms in past 6 months			
1	97/151 (64%)	54/151 (36%)	REF
2-4	182/339 (54%)	157/339 (46%)	1.30** (1.02-1.65)
>=5	68/178 (38%)	110/178 (62%)	1.73*** (1.36-2.20)
Number of STI symptoms in past 7 days			
0	103/213 (48%)	110/213 (52%)	REF
1	95/160 (59%)	65/160 (41%)	0.79** (0.63-0.99)
2-4	110/207 (53%)	97/207 (47%)	0.91 (0.75-1.10)
>=5	39/88 (44%)	49/88 (56%)	1.08 (0.86-1.35)
Genital ulcer			
No	276/483 (57%)	207/483 (43%)	REF
Yes	71/185 (38%)	114/185 (62%)	1.44*** (1.23-1.68)
Genital discharge			
No	153/291 (53%)	138/291 (47%)	REF
Yes	194/377 (51%)	183/377 (49%)	1.02 (0.87-1.20)
Thick and/or colored vaginal discharge			
No	190/350 (54%)	160/350 (46%)	REF
Yes	157/318 (49%)	161/318 (51%)	1.11 (0.95-1.30)
Itching of the vagina			
No	151/251 (60%)	100/251 (40%)	REF
Yes	196/417 (47%)	221/417 (53%)	1.33*** (1.11-1.59)
Unpleasant vaginal odor			
No	259/486 (53%)	227/486 (47%)	REF
Yes	88/182 (48%)	94/182 (52%)	1.11 (0.93-1.31)
Frequent urination			
No	283/516 (55%)	233/516 (45%)	REF
Yes	64/152 (42%)	88/152 (58%)	1.28*** (1.09-1.51)
Painful urination			
No	296/518 (57%)	222/518 (43%)	REF
Yes	51/150 (34%)	99/150 (66%)	1.54*** (1.32-1.79)
Pain during intercourse			
No	300/555 (54%)	255/555 (46%)	REF

Yes	47/113 (42%)	66/113 (58%)	1.27*** (1.06-1.52)
Bleeding during intercourse			
No	339/658 (52%)	319/658 (48%)	REF
Yes	8/10 (80%)	2/10 (20%)	0.41 (0.12-1.43)
Lower abdominal pain			
No	210/374 (56%)	164/374 (44%)	REF
Yes	137/294 (47%)	157/294 (53%)	1.22*** (1.04-1.42)
Genital warts			
No	328/640 (51%)	312/640 (49%)	REF
Yes	19/28 (68%)	9/28 (32%)	0.66 (0.38-1.14)

*** p≤0.01, ** p≤0.05, * p≤0.1

In multivariable analyses, significant factors associated with seeking treatment at a clinic for men included being from the inland community and having multiple STI-related symptoms in the past six months. For women, the only significant factor associated with seeking STI treatment at a clinic included having multiple STI-related symptoms in the past six months (Table 4).

Table 4. Predictors of clinic treatment seeking among STIPS participants who reported STI symptoms in the past 6 months (N=956), by gender

	MALES	**FEMALES**
	Adjusted PRR (95% CI)	**Adjusted PRR (95% CI)**
Age		
15-19 years	REF	REF
20-29 years	1.10 (0.61-2.00)	0.97 (0.70-1.33)
30-39 years	1.01 (0.54-1.90)	0.96 (0.69-1.33)
40-49 years	0.85 (0.44-1.64)	0.89 (0.61-1.31)
Community type		
Inland	REF	REF
Fishing	0.70*** (0.55-0.89)	0.97 (0.82-1.15)
Marital status		
Never Married	REF	REF
Married, Monogamous	0.92 (0.61-1.37)	1.57* (0.96-2.58)
Married, Polygamous	0.91 (0.52-1.59)	1.67* (0.99-2.81)
Previously Married	1.44* (0.97-2.14)	1.46 (0.86-2.47)
HIV status		
Negative	REF	REF
Positive	1.27* (0.98-1.67)	1.08 (0.90-1.30)
Number of STI symptoms in past 6 months		
1	REF	REF
>1	1.73*** (1.36-2.21)	1.41*** (1.12-1.78)

*** p≤0.01, ** p≤0.05, * p≤0.1

Previous treatment seeking and current STI prevalence

Among those who reported STI-related symptoms, CT prevalence was 11%, NG was 10%, TV was 13%, active syphilis was 7% and HSV-2 was 61%. The most common diagnosis for men and women who reported seeking treatment at a clinic in the past six months for their symptoms, was HSV-2 (53% and 67%, respectively). When we restricted our analysis to only those individuals who reported previously seeking clinic treatment for their symptoms, we found that approximately one-third tested positive for any curable STI (CT, NG, TV or active syphilis) at the time of the survey (45/136 [33%] males; 98/321 [31%] females) (Table 5). We found no significant difference in the current prevalence of curable STIs between those who did and did not previously seek clinic treatment, for either gender (for men: 33% with curable STI who previously sought treatment versus 27% with curable STI who previously did not seek treatment; PRR: 1.23, 95% CI: 0.86-1.75); for women, 31% with curable STI who previously sought treatment versus 33% with curable STI who previously did not seek treatment; PRR: 0.92, 95% CI: 0.74-1.15).

Table 5. Prevalence of any curable STI (CT, NG, TV or active syphilis) at the time of the survey among STIPS participants who reported STI symptoms in the past 6 months (N=956), by gender

		Any curable STI		
Gender	Treatment location	No N=657	Yes N=299	Crude PRR (95% CI)
Males (N=288)	No clinic	111/152 (73%)	41/152 (27%)	REF
	Clinic	91/136 (67%)	45/136 (33%)	1.23 (0.86-1.75)
Females (N=668)	No clinic	232/347 (67%)	115/347 (33%)	REF
	Clinic	223/321 (69%)	98/321 (31%)	0.92 (0.74-1.15)

*** p≤0.01, ** p≤0.05, * p≤0.1

4.5 Discussion

Prevalence of clinic treatment seeking

This study provides the first population-based assessment of STI-related symptoms and treatment seeking in two communities in rural Uganda since the mid-nineteen nineties and assesses factors associated with seeking treatment at a government or private clinic. Just over half (57%) of adults who reported STI-related symptoms in the past six months reported seeking any treatment for their symptoms, with similar rates in men and women. Seeking treatment at a clinic was 48% overall (47% among men; 48% among women). While our estimates were based on a population-based sampling approach of all eligible adults in our study communities, our estimations of clinic treatment seeking are lower than those found in previous studies, including the 2016 Ugandan DHS (70% for the country) and the first round of the RCCS in the 1990s (67% for the region).[4,74]

Our estimations of clinic treatment seeking may be lower than national estimates because of the communities included in our sample. The communities that we included are considered rural and treatment seeking tends to be lower in rural settings.[5,89–93] Because national-level estimates (e.g. DHS estimates) of treatment seeking include both rural and urban communities (and are not disaggregated by community type), we cannot compare the two. Because our study communities are not the same as the ones included in the first round of the

RCCS, and because of the difference in time, our overall estimates may not be comparable to the data drawn from the first rounds of the RCCS.

Differences in the prevalence of clinic treatment seeking by gender

Our data showed no difference in the prevalence of clinic treatment seeking by gender. This was unexpected, as other research in Uganda and the region suggest gendered patterns of treatment seeking in low-resource settings,[85,92,94–100] with women more likely to delay, and less likely to seek, STI treatment than men.[36,41,42,91,101] While the 2016 Uganda DHS estimates show a higher prevalence of clinic treatment seeking among women than men,[4] as aforementioned, we are hesitant to compare our findings to DHS estimates because of urban/rural differences. We recommend that future researchers continue to assess gender-specific treatment seeking behavior across a range of settings.

Differences in the prevalence of clinic treatment seeking by community type

Our analysis found that men in the fishing community are significantly less likely to seek clinic treatment, as compared to men in the inland community. The epidemiologic differences between fishing and inland communities in Rakai are well-established: fishing communities show a disproportionate burden of HIV, high prevalence of sexual risk behaviors and historically showed a lower use of combination HIV prevention services (though this has been increasing in recent years with significant new service provision).[21,69,102,103] Furthermore, data show

that overall, men in Rakai are less likely to be enrolled in HIV care[104,105] as are in-migrants.[104] Rakai fishing communities, or 'landing sites', generally have a high proportion of men, the majority of whom migrate from other communities in order to work as fishermen on Lake Victoria. Assuming that the barriers to HIV care for Rakai residents – including stigma, demanding work schedules, transport costs, belief in spiritual healing, long wait times and inadequate staff respect for patients[106] – also apply to STI treatment seeking, our observations indicating a lower prevalence of clinic treatment seeking among men in the fishing community is not unexpected. What is surprising, however, is the fact that this difference was not observed among women. We recommend future researchers explore the intersection of gender and community type, as well as try to better understand the barriers to treatment seeking in fishing communities among men.

Differences in the prevalence of clinic treatment seeking by STI symptomatology

We found the presence of some, but not all, symptom to be associated with clinic treatment seeking for each gender. For instance, lower abdominal pain, pain or bleeding during intercourse, and genital ulcers showed no association with treatment seeking among men in our study. The same goes for genital warts and thick/colored discharge among women. Not recognizing STI-related symptoms, not perceiving them as severe, or not attributing/misattributing them to STI-related causes can prevent treatment seeking.[5,86,90,107] A similar phenomenon may have occurred in our sample: participants may not have attributed lower

abdominal pain, warts or discharge to an STI, thereby explaining why the presence of some symptoms were associated with clinic treatment over others.

Private versus public clinics

The frequency of private clinic use was notable. The Ugandan healthcare system suffered losses during the decades of civil unrest in the 1980s.[108] Consequentially, Ugandans have come to perceive health centers as expensive and lacking medication, and many turn to self-medication first and use health centers as a last recourse if all else fails.[108–112] Also as a result of the political turmoil, the number of public health services in the Uganda decreased and the number of private clinics increased.[112,113] While we did not include a treatment location mapping exercise in our study, we did find a 2010 study that mapped the availability of private and public facilities in rural areas of Uganda.[114] Based on their work, the authors reported that public facilities made up 4.3% of all the health care units that were mapped as compared to private facilities which made up 95.7%. Private-for-profit clinics and drug shops made up 17.1% of all mapped facilities and private-not-for-profit facilities made up 1.6% of all mapped facilities.[114] While still considered rural, the districts included in their study are more central and developed than Rakai district. Nevertheless, we expect that their finding of more private than public clinics may still apply to Rakai. As such, the high prevalence of private clinic treatment that we observed may be partially explained by the high availability of private clinics in the area.

We also found a difference in private versus government clinic treatment seeking by gender, with women more likely to attend government clinics than men. Previous research has seen this to be the case in other settings, too.[115–117] A lack of finances, unfriendly reception and long wait times have been identified as reasons for why women do not seek care at formal sector clinics.[118] These factors may help explain why women in our study did not go to private clinics as often as men. More in-depth research into why women attended government clinics more than men would be useful to further contextualize our observation.

Factors associated with clinic treatment seeking

Our research identified community type (for men) and the number of STI-related symptoms (for both men and women) to influence clinic treatment seeking. As aforementioned, fishing communities are uniquely different from inland communities in a variety of ways, and so we are not surprised that being from the fishing community reduced the likelihood of seeking clinic treatment; once again, however, we are not able to explain why community type affected treatment seeking for men and not women, as we expected treatment seeking to be lower in fishing communities for both genders. It also makes sense that those who are experiencing a combination of symptoms (likely an indication of disease severity) would be more likely to seek treatment at a clinic than those who experienced just one, as was observed elsewhere.[91]

In contrast to our findings, other studies have found additional sociodemographic factors – such as increasing age (among women), higher education/literacy and a positive HIV status – to be associated with treatment seeking.[89,119–122] For age, one study in India suggested that older females may have better treatment seeking behavior than younger females due to their decision making and/or spending power;[89] Ugandan cultural norms may be different – age may not affect decision-making power – thereby explaining why age showed no association with treatment seeking in our study. For education, it is likely that we saw no association because of the limited nature of our data: we only asked participants whether or not they ever went to school (yes or no). It is possible that we may see an association between education and clinic treatment seeking if we broke down the level of educational attainment to more specific groups (i.e. none/illiterate, primary school, secondary school, post-secondary school).

Finally, the lack of association between clinic treatment seeking and HIV status surprised us; we expected that individuals who were HIV-positive to be more likely to seek clinic treatment for their symptoms than those who were HIV-negative. This was observed among Rwandan women.[122] Eighty-six percent of HIV-positive individuals in our study reported being on antiretroviral treatment (ART) at the time of interview; we would have expected that their routine interaction with the health system due to ART would make them more likely to attend a clinic for treatment than those without HIV, all other things being equal. HIV-positive individuals may also be more conscious of their sexual risk behavior

and sexual health than those who are negative,[123–125] furthering their likelihood of seeking clinic treatment. We speculate that the availability and affordability of services or stigma may have affected treatment seeking behavior among HIV-positive individuals. We recommend researchers continue to explore treatment seeking among HIV-positive individuals in order to better understand barriers to clinic care seeking.

Previous treatment seeking and current STI prevalence

We found that approximately one-third of men and women who previously sought clinic treatment for their symptoms were diagnosed with at least one curable STI (CT, NG, TV or active syphilis) at the time of the survey. Furthermore, our analysis showed no difference in the current prevalence of curable STIs comparing those who previously sought clinic treatment versus those who did not, for either gender. Assuming that seeking clinic treatment meant receiving treatment, these data could indicate that reinfection rates were high, treatment was inadequate, or both. Further studies exploring the temporal association between past treatment seeking, including receiving and adhering to treatment, and current STI prevalence are recommended in order to assess for treatment effectiveness.

Strengths and Limitations

A strength of our study lies in its population-based sample, which is rare in other studies focused on treatment seeking behavior. Calls have been made for a

broader research perspective in order to understand sexual healthcare seeking behavior.[43] This perspective includes a focus on non-attendance at healthcare services as well as research that uses non-patient samples recruited from non-medical settings in order to accurately capture the gamut of behaviors, beliefs and health issues occurring within the population and ensure appropriate and effective service provision.[43] We addressed these items in our study by interviewing all eligible individuals in our study communities and including both persons who did, and did not, seek treatment. Taken together, this information can provide program managers and decisionmakers with a better understanding of treatment seeking patterns within the community.

Despite this, our research is not without limitations. First, we did not further define treatment sources or ask participants to name specific treatment locations. As a result, it is possible that some treatment locations were misclassified in our analysis (e.g. drug shops being reported as private clinics, etc.), resulting in a biased estimate of prevalence and treatment seeking. In addition, inclusion of study participants was based on self-reported symptom history in the past six months and seven days. It is possible that eligible participants may have been not included because they were too shy, or embarrassed, to share their symptom history (social desirability bias), did not remember their symptoms (recall bias) or did not understand the terms we used for the symptoms. Given that the survey was administered by RHSP staff, it is also possible that participants over-reported seeking clinical care or under-reported seeking care in informal sectors

(or not seeking any care at all) in order to please the interviewer. Given the lower than expected rates of treatment seeking, however, we doubt this to be the case. In addition, our study did not assess environmental, social, psychosocial, economic, geographic or service-related factors, as well as symptom severity, which have been shown to be associated with treatment seeking behavior in low-resource settings.[5] The omission of such factors may have biased our results. We also did not measure the availability of each type of treatment location in our study communities – this information would be useful to contextualize our results. We also note that, while our study was sufficiently powered to assess for differences between men and women, we may have been underpowered to detect differences by both gender and community type. This sub-analysis may be of programmatic interest; we recommend that researchers consider this when designing future studies.

Finally, our analysis grouped together private and government clinics, and compared them to other treatment locations/no treatment. In doing so, we made the assumption that these clinics provided appropriate and effective care, of equal/sufficient quality, and that anything but clinical care was ineffective. This may be an unfair assumption: in low-resource settings, formal sector facilities tend to show poor quality of care in general.[126,127] It is likely, too, that, given the use of the syndromic approach and the low priority of STIs for health systems, STI care is especially poor in such settings. In fact, a study specifically on the quality of STI case management in Ugandan private clinics and drug shops

concluded that the quality of management was poor.[109] We recommend studying quality of care and barriers to providing quality care in local facilities, as well as urge leadership to strengthen care and enforce quality standards across health service sectors and facilities.

4.6 Conclusion

Timely and appropriate diagnosis is critical to STI control. We found that half of adults with STI symptoms in two rural Ugandan communities are not seeking appropriate clinical care under the syndromic management strategy. These individuals are a priority for public health intervention. We recommend researchers continue to focus on treatment-seeking behavior in low-resource settings and explore barriers to seeking care; we urge decision-makers to target their efforts in order to increase appropriate care seeking for STIs in this and similar contexts.

Chapter 5. The Acceptability of Self-Collected Samples for STI Testing: A Qualitative Study Among Adults in Rakai, Uganda

5.1 Abstract

Background: Timely and accurate diagnosis is critical to reduce the spread of sexually transmitted infections (STIs). Self-collected samples (SCS) for STI testing have been shown to be feasible and acceptable in high-income settings, where they have been shown to be an effective approach to expand STI diagnosis. However, few studies have assessed the acceptability of SCS for STI testing in a general population in low-resource settings. The objective of our study was to explore the acceptability of SCS among adults in south-central Uganda.

Methods: Our study was nested within the Rakai Community Cohort Study, a population-based study among adults in Rakai district, Uganda. We conducted semi-structured interviews among 36 adults aged 18-49 years, both with and without STI-related symptoms, after they self-collected samples for STI testing, as well as nine key informants, in order to assess the acceptability of SCS. We analyzed the data using an adapted version of the Framework Method, comparing prominent themes between genders as well as those with and without symptoms.

Results: We found that the acceptability of SCS did not differ by gender or symptom status. Overall, participants found no problem with SCS and did not find SCS physically uncomfortable. Perceived advantages to SCS included increased privacy and confidentiality and gentleness, as well as the perception that SCS

were best if resources are limited. Disadvantages included the lack of HCW involvement, fear of self-harm and the perception that SCS was unhygienic. Given this, most participants preferred healthcare worker (HCW)-collected samples to SCS (18/36 [50%] for HCW versus 13/36 [36%] for SCS; 5/36 [15%] with no preference). Nevertheless, almost all participants said they would recommend SCS to others and would do it again in the future.

Conclusion: Despite a preference for HCW-collection, SCS are still acceptable among adults in this population; SCS are a possible means to expand STI diagnosis and can be one additional tool to reduce disease spread. To promote SCS uptake and acceptability, proper education and messaging are needed to increase user's knowledge as well as allay their concerns.

5.2 Introduction

Countries in sub-Saharan Africa (SSA) currently use the syndromic approach to manage non-HIV sexually transmitted infections (STIs).[7] This involves a clinic-based examination and subsequent antibiotic administration for individuals who report symptoms common to prevalent STIs in the region. While practical and cost-effective, syndromic management can result in inappropriate- and/or over-treatment of STIs and the development of antimicrobial resistance.[10,28,128,129] Syndromic management of STIs also lacks the specificity of a diagnostic test and cannot detect asymptomatic cases, which comprise the majority of STI cases. Even among those with symptoms, the syndromic approach relies upon the patient to: a) recognize their symptoms, b) perceive those symptoms to be health-related and treatable and c) seek appropriate care.[8] Given these

limitations, the World Health Organization (WHO) has recommended a global shift away from syndromic case management in favor of etiologic testing where feasible and cost-effective.[9]

Self-collected samples (SCS) may be a way to make etiologic testing more accessible in low-resource settings. SCS for STI testing (SCS/STI testing) occurs when individuals obtain a swab or fluid sample themselves, either within or outside the clinic, and send the specimen to a laboratory for testing.[44] Research in high-resource settings show that SCS are as accurate as clinician-based tests,[45] and that SCS/STI testing interventions are feasible and acceptable in a variety of populations.[46–55] While not a replacement for clinic-based examination and clinician counseling, SCS may be a way to expand STI case management beyond the clinician- and clinic-dependent, syndromic approach.[60–62] By allowing the patient to collect a sample themselves, studies suggest that SCS can circumvent barriers to clinic- and/or clinician-based STI case management, like stigma and privacy concerns.[10–12] In particular, community- or home-based SCS interventions can provide direct services to those who would otherwise not seek care and treatment at the clinic or other formal establishments, perhaps due to access issues. For instance, SCS/STI testing can provide opportunities for testing outside of the clinic, such as within schools or homes.[60] A recent meta-analysis assessing the programmatic value of SCS/STI testing found that SCS increased overall uptake of STI testing services and case finding, suggesting that SCS could be an effective additional strategy to increase STI case

management.[62] For these reasons, the WHO recently recommended SCS as an additional approach to deliver STI testing services.[130]

Despite their potential, SCS/STI testing interventions are not common in SSA. This is due to a historic lack of cheap and accurate diagnostic tests,[63] as well as proper laboratory facilities. However, intensive scale-up of HIV care and treatment over the past 15 years has resulted in strengthened supply chains, infrastructure and laboratory capacity in the region. As such, the potential for using cheaper technologies to facilitate STI etiologic testing is now becoming a viable reality,[61] especially in countries like Uganda. In order to develop effective interventions, however, context-specific data are required, yet little data exist on the acceptability of SCS in a general population in low-resource settings. In a review of the literature, only a few studies explored the acceptability of self-collected swabs in the African context;[61,131,132] of these, only vaginal swabs were assessed and the experiences of men were not evaluated. While comparisons can be made to the acceptability of self-collection for human papillomavirus (HPV) testing – which has been more widely studied in the region[133–136] – here, once again, the perspectives of men are not represented. Studies assessing the acceptability of HIV self-testing (HIVST) in SSA include both men and women;[137,138] however, since HIVST involves a blood or oral fluid specimen, we lack data on the acceptability of self-collection using a genital swab in men. This qualitative study aimed to fill the existing research gaps and provide data on user acceptability of self-collected genital swabs for STI testing in both women and

men in a low-resource setting. Our study sought to answer the following research questions:

1. What motivates adults to provide a self-collected sample for STI testing?
2. What is their overall experience during the self-collection process?
3. How acceptable is SCS in comparison to healthcare worker (HCW)-collection?

5.3 Methods

Context

Uganda

Uganda Demographic and Health Survey data show a steady increase in self-reported STIs and STI symptoms in both men and women since the mid-1990s. In 2016, the self-reported prevalence of previous STIs and/or STI symptoms for those ages 15-49 years was 24.4% among women and 13.6% among men.[4] Similar to other low-resource settings in the region, Uganda currently mandates the syndromic management of STIs in all health care delivery levels in the country: in primary health care settings, syndromic management is recommended; in referral centers and hospitals where laboratories are available, it is recommended that the syndromic approach be “supplemented” by lab-based case management, “if necessary.”[7] As such, STI testing does not occur on a routine basis; the clinical management of disease is only initiated in the general population if a patient presents for care, and is based on health care provider experience to make a diagnosis and prescribe appropriate treatment.

Rakai

This study was based in the Rakai region of South-central Uganda. The majority of Rakai's population resides in small agrarian villages; however, the district also contains several mid-sized trading towns along the trans-African highway and fishing communities along Lake Victoria. Data from a community randomized controlled trial of mass STI treatment for HIV control from 1994-1998 showed that the STI burden in Rakai communities was high: prevalence of active syphilis was ~10%, *Trichomonas vaginalis* (TV) prevalence was 20%, and *Neisseria gonorrhoeae* (NG), *Chlamydia trachomatis* (CT) prevalence were ~4% and ~2%, respectively.[75]

Implemented by the Rakai Health Sciences Program (RHSP), the Rakai Community Cohort Study (RCCS) is an ongoing, open community-based cohort of residents aged 15-49 years in agrarian communities, semi-urban trading centers and Lake Victoria fishing communities in Rakai district. RCCS includes the administration of a demographic and health questionnaire, as well as HIV testing for all consenting participants. Nested within the RCCS, the STI Prevalence Study (STIPS) aimed to estimate STI prevalence among 1,825 sexually active HIV+ and HIV- men and women aged 18-49 years in two communities (one inland and one fishing), from May to October 2019. In addition to the standard RCCS questionnaire, STIPS included an STI module that assessed current and previous symptoms and treatment seeking behavior. STIPS participants were also tested for TV (in the field), syphilis (screening in the

field; samples tested in the lab), NG, CT, and herpes simplex virus type 2 (HSV-2) (samples tested in the lab). To this end, three HCW-collected penile-meatal swabs were obtained for all male STIPS participants who consented to STI testing. Because we were interested in men's experience with SCS, a fourth, self-collected swab was obtained from a sub-sample of men (n=40); it is from this sub-sample that we recruited the male study participants for our qualitative interviews (n=15). Three self-collected vaginal swabs were obtained for all female STIPS participants who consented to STI testing (HCW-collected samples were not obtained for females); it is from this sample that we recruited the female study participants for our qualitative interviews (n=21). All participants who self-collected samples received instructions from a same-gender HCW before sample collection and were then given privacy to self-collect. Interviews were conducted after participants received their HIV, TV and syphilis screening results but before their NG, CT and HSV-2 results. All individuals who tested positive for any STIs were provided treatment by RHSP according to the Ugandan National Clinical Treatment Guidelines for Sexually Transmitted Infections.

Methodology

This qualitative study was conducted among 36 adults – 15 men and 21 women – from the STIPS inland community who self-collected a sample in the STIPS. We selected participants based on their gender as well as their self-reported symptom status, with 9/15 men and 15/21 women reporting at least one STI-

related symptom in the last six months. We conducted semi-structured interviews with all participants that explored their experience and preferences related to self-collecting a sample for STI testing. We also conducted nine key informant interviews that covered similar topics, in order to contextualize participant data. Key informants (KIs) from various levels of the local health system were selected, including: a community mobilizer, a village health worker, a community health worker, a traditional healer, a STIPS team leader, a STIPS clinical officer, two local hospital-based clinicians and a district health officer.

RHSP social and behavioral scientists, experienced in qualitative research methods, conducted all interviews, which were in Luganda and lasted approximately a half an hour. After each interview, the interviewers and YPO discussed relevant and/or novel findings, reviewed reflexive notes and planned for the next interview. The average time between a participant's STIPS participation and their qualitative interview was approximately five days, with the majority of interviews occurring either immediately after or within a few days of STIPS participation. Because NG, CT and HSV-2 tests and syphilis titers were done in the RHSP central lab and not in the field, participants only had their final HIV and TV test results at the time of their qualitative interview. After all interviews were complete, interviewers transcribed and translated them to English. We then imported the data into MAXQDA 2018 (VERBI Software, 2018)[78] for review and initial analysis.

Our data analysis methods were adapted from the Framework Method.[79] First, we reviewed the interviews in MAXQDA to familiarize ourselves with the data. Second, similar to the Framework Method, we developed an analytic framework comprised of categories that were informed by our interview guide and research questions. We used this framework to index the interviews. Third, after all interviews were indexed, we charted the data into a framework matrix in Excel. We created one Excel spreadsheet for the 36 adults and another for KIs. Fourth, we used open-ended coding, followed by focused coding,[80] to identify prominent themes within each category. Prominent themes were defined by the depth of discussion any one participant provided on the topic, prevalence across participants and 'keyness' in relation to our research questions.[81] Fifth, we then compared the themes by gender and symptom-status in order to assess for any meaningful differences. Finally, we discussed our findings among the research team, comprised of interviewers and Principal Investigators, to assess for clarity and cohesion.

5.4 Results

Below, we present participants' values, preferences and experiences related to SCS/STI testing. Participants are identified by a pseudonym, and further described by their gender (M: male; F: female) and symptom status (S+: self-reported symptoms; S-: no self-reported symptoms). A description of the study sample is provided in Table 6.

Table 6. Characteristics of the 36 IDI participants

Characteristics		Number of Participants (n)
Gender	Male Female	15 21
Average age (range)	-	31 years (19-49 years)
Any STI-related symptoms in past 6 months	No Yes	12 24
Ever gone to school	No Yes	24 12
Marital status	Single Married Widowed/Divorced	9 26 1
Religion	Christian Muslim	31 5
HIV status*	Negative Positive	31 5

*Based on latest RCCS HIV test result.

Reason for Participation

The process of STI testing using SCS was novel to participants. When asked why they agreed to participate in the STIPS/STI testing, as well as why they agreed to SCS, most participants discussed valuing their health, often worded as their "condition." Participants indicated that ascertaining their disease status – and receiving treatment if they tested positive – was a major motive for participation. As described by one participant:

> *Most people; we are living, you are alive and yet sometimes you may have diseases that affect your health. So, when I heard about that service, I was so touched, and I wanted to know the condition of my body. If I am sick, I can come for treatment and be cured.* (Donozio, M, S-)

We also found that participants without symptoms referred to STIs as a 'hidden' condition, alluding to the fact that STIs can present with or without symptoms. As one man explained:

> *Because sometime diseases are there inside when you don't know they're there, so when you decide to test, you will be able to know them and treat them.* (Ponsiano, M, S+)

A few participants indicated also that they felt at heightened risk for STI infection, and that motivated them to participate. A few participants did not trust their partner or suspected him/her to be infected. This was expressed by both men and women:

> *Why I decided [to participate] is because you don't know how you stand, you may also not know how even the person you're having sex with is standing…* (Ponsiano, M, S+);

> *Now…the way we are with our partners, he may sometimes decide to get another woman and sometimes that woman may have an infection and he infects you without you knowing because it will not be written all over him that 'I got someone else'... And so it was a must for me to test myself.* (Juliet, F, S+)

Finally, we found that a few participants chose to participate because SCS was new to them; they were curious and wanted to learn how to do it.

Overall Experience

In terms of their experience self-collecting a sample, almost all of the participants reported ‘never [feeling] bad’ during the collection process and that they had ‘no problems’ with it. As one participant stated:

> *To be honest, me, I didn’t find any problem with it...It was easy to me and I was very happy about it.* (Bernard, M, S-)

We found that the SCS instructions that were provided by the HCW before participants self-collected samples, helped participants:

> *This time, we were given a chance to do it by ourselves without any difficulty…. I felt so good I was not scared at all; I did everything as instructed by the* musawo *<doctor> and I was able to collect the sample myself.* (Rose Mary, F, S+)

Overall, participants found the SCS process to be physically comfortable. The majority stated that they ‘never felt any pain’ during sample collection. A few men did indicate a minor discomfort when taking the swab but described it as “some

little pain" that was ultimately "bearable" (Richard, M, S+). In the words of one man:

> *Just like you feel anything getting in your body, you feel [the swab]. You find that maybe the way I removed it would have been painful, but I was not affected.* (Eugenio, M, S-)

While participant responses were generally positive, two symptomatic women did not appreciate the SCS experience. The first woman did not feel comfortable with SCS because it was a new method, while the second simply did not find the method acceptable:

> *[I] am satisfied [with] being checked by a musawo, I don't like self-testing.* (Rose Mary, F, S+)

SCS Advantages

Advantages of SCS included the perception that SCS are private/confidential and gentle, as well as the thought that they work best when resources are limited.

Regarding privacy and confidentiality, some participants felt that SCS removed feelings of shyness and embarrassment associated with undressing in front of a HCW. This sentiment was expressed by both men and women:

I prefer doing it [collecting a sample] myself...If a musawo *collected from me and touches my penis, somehow, I will feel shy.* (Robert, M, S+);

The good thing is that if I self-collect there is nothing like obuswavu *<showing your nakedness> compared to when the health worker collects it….when the* musawo *is collecting the sample I must squat and then the* musawo *will see my private parts when removing the swab...*Musawo*, I prefer collecting it myself.* (Phionah, F, S-)

Some participants also liked SCS because it avoided embarrassment caused by being 'dirty'. 'Dirtiness' related to being ungroomed or unkempt in the genital area. In the words of one participant:

Personally the issue I have noticed there with the musawo *collecting the sample is…[because] you were not given proper notice, so probably you came when you have not groomed or prepared yourself well. That is the problem I see.... [laughs] the* musawo *may find when you are somehow dirty [laughs].... You might come when you have not cleaned up and she says, get ready am collecting the sample and you get embarrassed because you came not well prepared.* (Fausta, F, S+)

A few men wanted to avoid this embarrassment as a professional courtesy to the HCW. As one man described, a patient may come when they are "*munda oyo*

tasawayo <not shaven>;" this could "for sure…scare the health care worker." He later stated that self-collecting a sample was best as it would avoid disturbing the HCW in such a way (Robert, M, S+).

'Dirtiness' was also mentioned in the literal sense; participants felt that SCS was better because it avoided embarrassment and discomfort due to bad hygiene:

> *The other advantage [to self-collection] is that you may come when you're not very clean and sometimes it may cause shame between you and the health worker...Someone might not have showered in a while so it may be shaming to undress before the health worker.* (Patrick, M, S-)

Confidentiality was another perceived advantage to SCS. Some participants, including both men and women, felt that SCS was more confidential than HCW-collection. Participants described a local environment of mistrust and rumor mongering: "community people [i.e. people in the community/neighbors] are rumor mongers," explained one woman, "they tell everyone." (Martha, F, S-) Participants therefore valued confidentiality and the 'keeping of secrets.' Participants felt that SCS allowed them to maintain the secret that they participated in STI testing:

> *[Self-collecting] is good, and [secrets don't] spread because it is you that takes it off and give it to the health worker and it stops at you two.…[Self-*

collection] will also continue to keep secrets because it remains with just you. (Patrick, M, S-)

SCS was also perceived as advantageous for those who feared to discuss their private matters with a HCW. As one woman described it:

For those people who are afraid of approaching a health worker to tell him/her the truth; it will be good because they will be self-testing and doing everything by themselves...everyone has their own secrets that they are hiding. (Rose Mary, F, S+)

Some participants felt that SCS was gentler than HCW-collection. This was especially true among participants who reported symptoms. Both men and women feared that the HCW would inflict pain when taking a sample. As this participant described:

You may find someone [a HCW] who presses [the swab] so hard…but if it is you…[and] you get it yourself very well and find that you do not feel the pain like [when] the musawo *does [it].* (Eugenio, M, S-)

Some participants felt that SCS would be less painful because the patient 'knows their own body,' as opposed to the HCW, who does not. As two participants described it:

> Musawo*, I know my body; the* musawo *may insert it far. [laughs]...I would be thinking that what if she pierces me.* (Angela, F, S+);

> *[Long laughter] It's me [who is] supposed to insert it there...it's you who knows where you want it to stop in order to get the sample because if the health worker inserts, she might think that she is hurting you but if you insert yourself you are able to know where to stop it.* (Esther, F, S+)

Finally, some participants felt that SCS would save resources if used at home, such as time and money. As one man explained:

> *[Because] you can test yourself, it helps you to save money, time say that you would have used from here for example to Kalisizo [the neighboring hospital].* (Ponsiano, M, S+)

Key informants agreed, and added that SCS would benefit areas with poor clinic access:

> *[Self-collection] can work in villages where there are no hospitals, where there is no transport, [self-collection] can work for people who want secrecy and fear stigma, it can have a breakthrough.* (Julius, Assistant District Health Officer)

Some participants also perceived SCS to be a faster method in comparison to HCW-collection, where clinic waiting times could cause delays.

SCS Disadvantages

Disadvantages of SCS included the lack of HCW involvement (and thus their training and expertise) in the collection process, fear of self-harm and the perception that SCS was unhygienic.

Regarding HCW involvement, some participants worried that, if they were to collect a sample in the absence of a HCW, they may collect it poorly. Participants felt that the HCW was better trained and more experienced than them, and as such, would carry out the process correctly. As one participant explained it:

> *The health worker is more experienced in carrying out these tests and gets to know the results very fast, as for me I will be there debating whether I carried out the test in the right way.* (Richard, F, S-)

Another participant had a similar response:

> *I might [use the swab] wrongly or insert it wrongly, I might not know exactly how best to insert it and how far it should go, however a* musawo

knows how best to insert and how far it should go and how best to remove it. (Godfrey, M, S+);

Key informants also felt that low-literacy levels in the area would inhibit proper sample collection, because users may not read the instructions correctly:

You will find different categories of people in the community; however, the biggest number are illiterate – they cannot read – so [they] may not understand exactly what to do. (Ivan, Community Mobilizer)

A perceived risk of self-harm was another disadvantage of SCS. Some participants were afraid of hurting themselves if they took the sample. In the words of these participants:

My worry is that [I] may insert it wrongly and hurt the uterus which may not be the case when the musawo *does it because she knows how everything is.* (Rose Mary, F, S+);

Personally, I would prefer the health worker to collect…she is a health worker, she can't insert it as if she is going to kill you. (Annet, F, S+)

Finally, some participants were concerned that SCS was unhygienic: they stated that users do not wear gloves when they self-collect, whereas HCW do. Because

of this, participants were afraid of spreading germs in their genital area with SCS. As one participant described:

> *What causes me to fear is [that the doctor] puts on gloves, [inaudible] and yet he has told me to do it with bare hands. Which means I can come when I have cleaned up myself, but someone else may come from the garden, has been digging and then starts from there. Now don't you see his hands, if they have germs and then he touches his genital areas...And it is not good for them.* (Eugenio, M, S-)

Preference and Future Use

When asked for their ultimate preference, the majority of participants preferred HCW-collection over SCS (18/36 [50%] for HCW versus 13/36 [36%] for SCS; 5/36 [14%] with no preference). This was true regardless of symptom status or gender, though it should be noted that women – especially those reporting symptoms – were more amenable to SCS than men (9/21 [43%] of women preferred SCS versus 4/15 [27%] of men).

Nevertheless, we found that almost all participants would recommend SCS to others, whether it be their friends, family or peers. We also found that almost all of the participants were willing to use SCS again in the future, citing once again a concern for their health. Many recognized the utility of SCS as a means to

receive an STI diagnosis and valued the opportunity to ascertain their disease status again in the future. As one man stated:

> *I would use [SCS in the future] because sexually transmitted infections don't just come in a particular time and stop – they come any time – so I would like to keep using this method so that I can know where I stand.* (Patrick, M, S-)

While almost all participants were willing to use SCS again, we did find one woman who stated that she would not use SCS again in the future because she was afraid that community members would spread rumors about her if they found out she participated.

5.5 Discussion

In this qualitative study in south-central Uganda, we found that SCS was acceptable to both male and female participants; this was the case regardless of whether or not they reported STI symptoms. Overall, participants reported a positive experience with self-collection. Advantages of SCS included confidentiality, privacy and comfort, as well as the perception that SCS were best if resources were limited. Disadvantages included a lack of HCW involvement, as well as the fear of self-harm and the perception that SCS was unhygienic. Given this, most participants said they preferred a HCW-collection for STI testing. Nevertheless, we found the findings on future use to be encouraging: regardless of participants' preference for who takes the sample, with one exception, all

participants stated that they would recommend SCS to others and would use SCS again in the future.

Data on the acceptability of self-collected genital swabs for STI testing in a general population in low-resource settings, particularly in SSA, are rare. Our findings corroborate previous studies in Rakai, which demonstrated that self-administered vaginal swabs were valid and acceptable methods to screen for STIs among women, and urine samples were acceptable to both women and men.[56–59] Our findings also agree with those of a systematic review by Paudyal et al. on patient experiences obtaining self-samples to diagnose STIs.[52] While the review included a variety of self-collection methods (not just genital swabs) and only two studies from low-resource settings, it evaluated the same STIs as our study, and found that the majority of adults accepted SCS and found it to be an 'easy' procedure. The review also found that privacy and safety were the most common concerns adults had about SCS, with 30% of adults reporting concern about privacy and 17% about safety.

While more specific to women, we can draw comparisons between our data and data on the acceptability of self-collected swabs for HPV testing in SSA. Also recently recommended by the WHO in the fight against STIs alongside SCS for NG, CT, TV and syphilis testing, self-sampling for HPV involves the collection of a sample that can be conducted in the absence of a clinician using a vaginal or cervico-vaginal swab. Similar to our findings, a study accessing the acceptability

of SCS for HPV testing among women in Cameroon found SCS to be acceptable, with women finding it easy to perform, less painful, less embarrassing, less anxiety-inducing and more comfortable than clinician-collected samples.[133] A feasibility and acceptability study in Malawi also found SCS to be easy to perform and easy to understand by study participants, with the majority of women expressing confidence that they did it correctly.[134] While 75% of participants reported no concerns with the method, some percentage of women did worry about pain, inaccurate results or that they may not test correctly. We also found two studies located in Uganda: a quantitative study by Mitchell et al. focused on women in a low-resource community in Kampala, and found that more than 80% of participants were willing to collect their own HPV samples.[135] However, we note that, in that study, SCS was delivered by a HCW to the participant's home (and SCS was conducted there, too); therefore it possible that the high acceptability that the authors observed could have been due to either: the location of sample collection (i.e. at home), the mode of delivery (i.e. by a HCW), the collection method (i.e. SCS), or some combination of the three. Despite this, the study did identify some barriers to self-collection, including: embarrassment due to a lack of privacy (in the home/community), worry of collecting incorrectly and older age. Likewise, a mixed methods study by Bansil et al. conducted across three sites – India, Nicaragua and Uganda – found that 75% of all women felt SCS was easy, though initial concerns included hurting themselves (52%) and getting a bad sample (24%).[136] Women also reported concern over the inability to see their own genital area and an

unwillingness to touch the genital region; similar to our study, participants also valued sanitation, privacy and cleanliness in the collection process.

To our knowledge, this was the first study to explore the acceptability of self-collected penile-meatal swabs among men in a low-resource setting. We were surprised that SCS acceptance among men in our population was not higher. We expected the majority of men to accept SCS because of privacy and their masculinity: we expected that men would rather self-collect in order to avoid undressing and exposing themselves in front of a clinician. This was observed among men in their acceptance of HIV self-testing (HIVST) in SSA.[138] We also expected men to prefer SCS, as it would give men the flexibility to test during non-clinic hours, as was observed in men's HIVST acceptance.[137] This was the case for some, but not all men. We recommend researchers continue to explore SCS acceptability among men in diverse settings.

Finally, we were initially surprised by our finding that both men and women preferred a HCW-collected sample over SCS, despite indicating that SCS was acceptable. The aforementioned review by Paudyal et al. found that SCS was preferred to HCW-collection.[52] A study assessing the acceptability of self-collected penile swabs among men in the U.S. also found that 77% of participants preferred a self-collection over attending a clinic.[139] Data on HPV self-sampling preferences, however, present a mixed picture: one systematic review amongst women in mostly high-resource settings found that the majority

of participants preferred self-sampling over clinician-based sampling.[140] Another review found that about half of the included studies showed that participants preferred SCS, while the other half showed that women preferred clinician-collection because they lacked confidence in their ability to self-collect a sample correctly.[141] The authors also reported that, in ten of the 23 included studies, women felt that clinician sampling was more reliable than SCS. Results from the aforementioned HPV studies based in SSA also show that our findings are, in fact, not unexpected: the study in Cameroon found women's 'uncertainties' about the reliability of SCS to be a barrier to acceptance; despite high acceptance of HPV self-sampling, the majority of participants preferred physician sampling because they were unsure if they sampled correctly and/or felt that clinician-sampling was more trustworthy.[133] In the study by Bansil et al., too, the authors reported that the acceptance and uptake of SCS for HPV testing was highest in Uganda at 100% (versus 99.5% in rural Uttar Pradesh, 82.8% in Nicaragua and 78.6% in Hyderabad), but this acceptance dropped when SCS was compared to clinician collection: only 64% of women in Uganda preferred SCS over clinician-collection (versus 50% in Nicaragua, 93.1% in Uttar Pradesh and 95.5% in Hyderabad).[136] The authors reported that while women in Hyderabad and Nicaragua were mainly concerned about hurting themselves when self-collecting, women in Uganda were most concerned about not getting a good sample.

The disconnect that we observed – between participants' acceptance of SCS but preference for HCW-collection – could be explained by the legacy of health

services provided in the Rakai region. Established in 1987, RHSP has been delivering health services to the community for decades; the majority of Rakai community members are either current or past RCCS participants and are familiar with RHSP and its services. With some of the highest rates of HIV in the country, the region is also no stranger to other public health interventions and services, including PEPFAR-funded activities. As such, it is possible that community members have come to perceive (RHSP) clinicians and HCWs as powerful authorities. Our data suggest this to be true: some participants felt that HCWs were 'experts,' and that their [the participants'] 'lives were in their [the HCW's] hands.' This would have us believe that, while participants may have accepted SCS, they did not feel as confident in their abilities to collect a sample when they were being compared to a HCW, because the HCW was 'better trained,' 'more knowledgeable' and 'better able to complete the task' than them.

Strengths and Limitations

This study was novel in that it explored the acceptability of SCS among a general population of women and men in a low-resource setting, and provided participants the opportunity to self-collect. Because they were able to use the swabs themselves, we were able to gather detailed and practical feedback on the ease of use and their experience. Men experienced both SCS and a HCW-collected sample, which allowed them to draw direct comparisons between the two. On the other hand, women only self-collected a sample and did not experience HCW-collection, but were still asked to compare the two. We feel that

women can fairly easily imagine what a HCW-collected would be like, particularly if they have experienced antenatal care before, and so we do not believe that the credibility of their responses was affected. However, it is possible that their opinions could change after they experienced HCW-collection, in other words, that their stated preferences may differ from their revealed preferences.[142,143]

Another strength of our study included the qualitative nature of data collection. By using semi-structured interviews, we were able to gather rich descriptions and a breadth of responses, which would not have been possible in a quantitative survey. Nevertheless, it is possible that social desirability bias may have affected our results: because our interviewers were RHSP staff members, it is possible that participants responded more favorably to SCS than they would have otherwise; additionally, they may have reported a preference for HCW-collection out of respect for the RCCS HCWs, even though confidentiality of responses was assured and reviewed during the informed consent process. We doubt these possibilities strongly biased our results, given the fact that participants provided both advantages and disadvantages for both collection methods.

Lastly, another strength of our study was the fact that we selected adult participants from within the community, and purposefully selected them based on both their gender and symptom status. This allowed us to assess if acceptability varied between users across these strata, which could help guide the development of future SCS/STI testing interventions. However, this qualitative

study focused only on men and women in the inland community and we did not specifically recruit any high risk groups, such as truck drivers, sex workers or fisherfolk. Given their mobility and sexual risk behaviors, such groups are key targets for a SCS/STI testing service. Understanding their acceptance of SCS is critical for future program development. Age[135] and awareness[144] have also been shown to affect SCS acceptability. Level of education and/or socioeconomic status may also influence participant preferences.[144–146] We did not sample based on these criteria; we recommend future studies use mixed methods to explore how such contexts could influence SCS acceptability.

5.6 Conclusion

Our study found that SCS were acceptable, but concerns over taking a sample without a HCW, self-harm and poor hygiene made the majority of men and women in our population prefer HCW-collection. Nevertheless, users said they would still use SCS in the future. Taken together, these findings suggest that SCS is an acceptable, additional approach to current STI diagnostic methods. To promote SCS uptake and acceptability, we recommend decision-makers use these data to design health communication messages that allay user concerns – such as pictures showing how to sample safely and correctly – as well as messages that emphasize the perceived advantages – such as increased confidentiality and privacy. SSA needs a diversity of strategies to address the STI burden and prevent the spread of infection. SCS/STI testing is one tool in the toolbox; we encourage researchers to continue to provide data that explore the acceptability, viability and feasibility of SCS/STI testing in low-resource settings.

Chapter 6. STI Testing Using Self-Collected Samples: A Qualitative Investigation on Service Delivery Preferences Among Adults in Rakai, Uganda

6.1 Abstract

Background: Self-collected samples (SCS) for sexually transmitted infections (STI) testing (SCS/STI testing) is a promising approach to expand STI diagnosis in low-resource settings. For the user, SCS/STI testing involves multiple activities besides the self-collection of a sample, including requesting sampling materials, receiving those materials, returning the sample to the laboratory and receiving results and treatment, if necessary. With the potential to sample outside of the clinic, many questions exist around SCS/STI testing service delivery, including where and how these activities can be completed and what users most prefer. This study explores user acceptability of and preferences for various approaches for SCS/STI testing service delivery in Rakai, Uganda.

Methods: This qualitative study sampled 36 adults both with and without STI-related symptoms, who resided in an inland community and self-collected samples for STI testing as part of the Rakai Community Cohort Study. We conducted semi-structured interviews to assess the acceptability of and preferences for various approaches for service delivery for the different SCS/STI testing activities. Approaches of interest included: facility-based (e.g. at a clinic or community location), home-based (the participant's home), mobile phone communication, postal mail or the internet. We analyzed our data using an adapted version of the Framework Method, comparing themes between genders, activities and approaches.

Results: Among our sample of 36 men and women, almost all approaches for service delivery were acceptable, though some had greater support than others. Participants found it equally acceptable to complete SCS/STI testing activities on-site at a facility or at home, but for different reasons. There were concerns around mobile phone communication, and postal mail and online approaches were not very acceptable. Participants' preferences were explained by a variety of themes – including privacy and confidentiality; HCW consultation and counseling (HCW interaction); certainty; access and resources; time; and personal responsibility and professional courtesy to the HCW. While we did not find one, most preferred approach, we found that men and women most preferred approaches that they perceived to be more confidential and private and/or allowed for HCW interaction (e.g. facility- and home-based approaches).
Conclusions: To our knowledge, this is first study to comprehensively explore user acceptability of and preferences for the delivery of a SCS/STI testing service in a low-resource setting. Our data suggest that, in our population, individual choice is critical for SCS/STI testing service delivery, though common themes of confidentiality and HCW interaction exist. We recommend public health guidance allow for different approaches for SCS/STI testing service delivery in order to make the service acceptable to the larger population.

6.2 Introduction

Sexually transmitted infections (STIs) are a global issue of growing concern; more than one million STIs occur every day.[147] STI infection has deleterious effects on both reproductive health and quality of life and can increase the risk of

HIV acquisition three-fold.[13–15] Sub-Saharan Africa (SSA) – where over two-thirds of new HIV cases and AIDS-related deaths occur – accounts for approximately 40% of the global STI burden[16] and the largest per-capita rates of syphilis, *Neisseria gonorrhoeae* (NG), *Trichomonas vaginalis* (TV), and herpes simplex virus-2 (HSV-2) globally.[17,18]

Accurate and timely diagnosis is critical for STI control. Similar to other low-resource settings, countries in SSA currently use the syndromic approach to manage non-HIV STIs.[7] While practical and cost-effective, the syndromic approach can result in inappropriate- and/or over-treatment of STIs and the development of antimicrobial resistance.[128] Given these limitations, the World Health Organization (WHO) has recommended a global shift away from syndromic case management in favor of etiologic testing where feasible and cost-effective.[9] Despite their successful implementation in high-income settings, STI testing programs are not commonplace in SSA because of a lack of cheap and accurate diagnostic tests;[63] and a historic lack of well-equipped laboratory facilities. However, intensive scale-up of HIV care and treatment activities in the region over the past 15 years have resulted in strengthened supply chains, infrastructure and laboratory capacity. This scale-up in the context of HIV has opened up the potential for using cheaper technologies to facilitate STI etiologic testing.[61]

One approach to etiologic STI testing involves the use of self-collected samples (SCS). SCS involves an individual to take a swab of fluid sample themselves, either within or outside a clinic, which is then sent to a lab for testing.[44] SCS for STI testing (SCS/STI testing) is currently implemented in high-resource settings, where data show that the method is as accurate as clinician-based tests.[45] Research also shows that SCS/STI testing is acceptable in a variety of populations and they are feasible to implement.[46–55] Given these benefits, the WHO recently recommended SCS/STI testing as an additional approach to deliver STI testing services.[130]

Because an individual can take the sample themselves, SCS/STI testing can expand the availability and reach of etiologic testing services: since services are neither clinician-dependent nor tied to a clinic, they can be made available in a variety of other venues, including pharmacies, schools and even at the users' home.[60–62,148–150] However, because there is no precedent for SCS/STI testing services in SSA, questions exist around where and how services can be delivered and what approach for service delivery is most preferred by users.

This study uses qualitative methods to explore user service delivery preferences for a SCS/STI testing service. We sought to answer the following research questions:

1. How acceptable are various SCS/STI testing service delivery approaches?
2. Which approach is most preferred and why?

6.3 Methods

Context

This study was based in the Rakai region of South-central Uganda. The majority of Rakai's population resides in small agrarian villages; however, the district also contains several mid-sized trading towns along international highways and fishing communities along Lake Victoria. Data from a community randomized controlled trial of mass STI treatment for HIV control from 1994-1998 showed that the STI burden in Rakai communities was high: prevalence of active syphilis was ~10%, TV prevalence was 20%, and NG and *C. trachomatis* (CT) prevalence estimates were ~4% and ~2%, respectively.[75]

The Rakai Community Cohort Study (RCCS) is an ongoing, open community-based cohort of residents aged 15-49 years in agrarian communities, semi-urban trading centers and Lake Victoria fishing communities. RCCS includes the administration of a demographic and health questionnaire, as well as HIV testing for all consenting participants. Nested within the RCCS, a STI study entitled the STI Prevalence Study (STIPS) was conducted to estimate STI prevalence among 1,825 sexually active HIV+ and HIV- men and women aged 18-49 years in two communities (one inland and one fishing), from May-October 2019. In addition to the standard RCCS questionnaire, STIPS included an STI module that assesses current/previous symptoms and treatment seeking behavior and evaluated participants for syphilis, NG, CT, TV, and HSV-2. To this end, three clinician-collected penile urethral meatus swabs were obtained for all consenting men

(n=860), with a small sub-sample of men (n=40) asked to also self-collect a sample using a fourth swab; all consenting women (n=964) were asked to provide three self-collected vaginal swabs.

Study Sample

This qualitative study was conducted among 36 adults – 15 men and 21 women – from the STIPS inland community who self-collected a sample in the STIPS. Participants were selected based on their gender and variation in self-reported symptom status, with 24 participants (9/15 men, 15/21 women) reporting any STI-related symptoms in the last six months and 12 participants (6/15 men, 6/21 women) reporting no STI-related symptoms. Once identified, participants were asked to participate in a semi-structured interview that explored their service delivery preferences.

Defining a SCS/STI Testing Service

Prior to data collection, to understand the delivery requirements for a SCS/STI testing service, we first reviewed the literature for data describing the structure and implementation of past and present SCS/STI testing services.[139,151–155] From these data we found that there were more user-dependent activities involved in SCS/STI testing than just the act of self-collection. From our review, we identified five common user-dependent activities: (1) requesting SCS materials, (2) physically receiving those materials (and self-collecting a sample), (3) returning self-collected samples to the lab for testing, (4) receiving test results and (5)

receiving treatment. We concluded that, together, these five activities – hereafter referred to as 'testing activities' – represented the basics of a SCS/STI testing service. As such, in this study, we defined a SCS/STI testing 'service' as comprised of these five activities. We used this definition to design our interview guide and inform the structure our qualitative interviews, which are further described below.

Because a SCS/STI testing service allows for sampling outside of a clinic, we also reviewed the data for various approaches for service delivery. To this end, we found that an array of different SCS/STI testing service delivery approaches can be considered, depending on the context, target population and resources of the testing program. We found that SCS/STI testing services were largely facility-based (where the user completes activities on-site at a clinic, pharmacy or some other predesignated location) or home-based. In addition, various channels were used to facilitate the completion of some testing activities. These included: text messages or phone calls (mobile phone communication), postal mail or the internet (online). This information was also used to structure our interview guide.

To illustrate how the testing activities and approaches for service delivery relate to one another, we can look at a SCS/STI testing service that is currently implemented in the US. 'iwantthekit.org,' is a SCS/STI testing service that is available to men and women 14 years and older in the Baltimore, Maryland and Washington D.C. areas in the US.[139,151,152,156] As a part of this service, users can

request self-test kits online (Activity 1; approaches: home-based and internet). Users receive the kits via postal mail, and collect a sample at home (Activity 2; approaches: home-based and postal mail). Users then send their samples to the lab for testing via postal mail (Activity 3; approaches: home-based and postal mail) and results are returned to users online (Activity 4; approaches: home-based and internet). Users are then required to receive their treatment by picking it up in-person at a clinic or pharmacy (Activity 5; approach: facility-based).

Data Collection

We used semi-structured qualitative interviews to assess user preferences for the various approaches for service delivery. As aforementioned, we defined a SCS/STI testing service as comprised of five testing activities, which can be completed in one of two locations and/or via various channels. We chose to collect data for each activity, rather than for the service as a whole, in order to capture any differences in preference that may exist between the activities.

At the start of each interview, interviewers first described the goal of a SCS/STI testing service to the participant. Then, the interviewer described the one of the five testing activities to the participant as well as each of the service delivery approaches. Then, the interviewer asked the participant what they felt were advantages and disadvantages of each of the approaches in relation to that activity. Finally, interviewers asked the participant to select their preferred approach for service delivery for that activity and explain why. This exercise was

repeated for all five of the testing activities. As an example, for the first activity (requesting sampling materials), interviewers asked participants to describe the advantages and disadvantages of: (a) requesting materials at a facility, (b) requesting materials from their home (via a home visit from a health worker or some other representative), (c) requesting materials via mobile phone (by text or phone call), (d) requesting materials via postal mail and (e) requesting materials via the internet. Then, participants were asked which of the aforementioned approaches they would ultimately prefer in order to request sampling materials, and why.

All interviews were conducted and recorded in the local language – Luganda – by one of three behavioral scientists trained in qualitative research methods, and lasted approximately a half an hour. Interviewers were trained on the research objectives and participated in numerous roleplay exercises to make sure that they understood the purpose and structure of a SCS/STI testing service, including the five testing activities and approaches for service delivery. Interviewers were also trained to redirect participants back to the research questions in the event that they suspected that the participant did not understand what they were being asked. Throughout data collection, the study team engaged in-depth debriefs after each interview to discuss relevant and/or novel findings, take reflexive notes and plan for the next interview.

Analysis

After all data were collected, interviewers transcribed and translated the interviews to English. Then, we imported the data into MAXQDA 2018 (VERBI Software, 2018)[78] for review, initial coding and analysis. First, we noted each participant's most preferred approach for service delivery for each of the testing activities. Second, we used an adapted version of the Framework Method[79] to identify prominent themes around participant preferences. To this end, we used our interview guide to develop an analytic framework. Similar to the Framework Method, we indexed our transcripts using the framework and charted the data into an Excel spreadsheet. We then used open-ended, followed by focused coding,[80] to identify prominent themes for each testing activity. Prominent themes were defined by the depth of discussion any one participant provided on the topic, prevalence across participants and 'keyness' in relation to study research questions.[81] We also assessed for prominent themes within each approach for service delivery. We then compared the data by gender and symptom-status in order to assess for any meaningful differences between the groups. We discussed our findings with the larger research team, comprised of interviewers and Principal Investigators, and present them here.

6.4 Results

The Acceptability of Various Approaches for Service Delivery

Participants were most accepting of facility-based and home-based service delivery, to a similar degree. Mobile phone communication was sometimes acceptable and postal mail and the internet were least acceptable. We identified a number of themes that explained participants' acceptance of the different

approaches for service delivery, which are further elaborated below and of which included: privacy and confidentiality; HCW consultation and counseling (HCW interaction); certainty; access and resources; time; and personal responsibility and courtesy for the health worker (responsibility and courtesy) (Table 7).

Table 7. Description of prominent themes

THEME	SUB-THEME	ILLUSTRATIVE QUOTES*	RELEVANT SCS/STI TESTING ACTIVITIES
Privacy and confidentiality†	Testing as a 'secret' process and a personal issue	• "It's a private issue…[I] want to take [it] as a private issue such that people will not know." (Justina, F, S+)	• A2. Receiving SCS materials/collecting a sample • A4. Receiving test results • A5. Receiving treatment
	Rumor-mongering and gossiping in the community	• "If one knows the problem you have, they cannot keep a secret, they spread it." (Juliet, F, S+) • "People are gossipers…You can do something, and find that everyone knows about it." (Jane, F, S-)	
	Rumor-mongering and gossiping in the clinic	• "The clinics, we have *basawo* <doctors> who are our peers here; they may do some rumor mongering...It results into ashaming you." (Sophia, F, S-)	
	HIV-related stigma	• "You see how you [the interviewer] have come here [to my community], people are thinking something totally different…As we are seated here, they think you are talking to me about HIV/AIDS...It hinders [us] because people stigmatize you about something you are not." (Immaculate, F, S+)	
HCW interaction	How to self-collect and use SCS materials	• "There may be some things especially about how to use the kit you may want to inquire from the *musawo* <doctor>, so that you leave the place after understanding." (Prossy, F, S+)	• A2. Receiving SCS materials/collecting a sample • A5. Receiving treatment
	Language barriers and ability to read instructions	• "I may not know how to read the direction on the kit…not everyone can read English and translate it so…where you can't read, the health worker	

		reads for you…and [you will] know how to use it."(Maria, F, S+)	
	HCW as a health expert	• "[HCWs have] more experience and better knowledge." (Rose Mary, F, S+) • '[If services were facilitated by a HCW, then I] am sure you will get the truth." (Rose Mary, F, S+)	
	HCW needed for healing	• "If you don't see the *musawo*, you cannot heal. You have to see the *musawo* and explain what you are suffering from and he gets you the medication." (Gerald, M, S+) • "It is always good to… see a *musawo*; you share views and decides for you what he/she feels is right for you…the *musawo* is the one who will give you medicine to cure your illness, so basically our life is in the hands of *basawo*." (Prossy, F, S+)	
	Patient-provider relationship	• "The health worker is the service provider, you can call him…and [he] gives it to you as this service is...It shows you have a connection with the health worker, he knows something about you, you call him, and he knows what is going on." (Hassan, M, S+) • "[Seeing the doctor] can ease the communication between the patient and the doctor….it can build the 'relationship' – the relationship between me and the doctor. There is a strong relationship built because you are face-to-face. It gives one time to explain to the doctor and receive advise." (Bosco, M, S+)	
	HCW counseling	• The truth is that there is a way [the HCW] will counsel me and I do not worry so much about the disease I have. I get encouraged. (Jane, F, S-)	
Certainty	User's personal failures	• "[I] can make a mistake [taking a sample]…[whereas the HCW] might take it off as he wants." (Hassan, M, S+)	• A3. Returning samples to the lab

		• "I may not be responsible enough to [return the sample], it may become difficult for me." (Stella, F, S+) • "[I] may keep it for a long time and sometimes it gets lost…I may get [a sample] and I misplace it." (Sophia, F, S-)	• A4. Receiving test results
	Sample safeguarding	• "[The HCW] cannot mix or disorganize the samples to end up elsewhere." (Annet, F, S+) • "I would prefer the *musawo* delivering [my results] at home or personally picking them...Because my results will be safe no one will have to know...It's something taken under tight security." (Joyce, F, S+) • "[The HCW will be] sure that this box I have got it from this lady, if it has a number or names it can be packed and he gets where to place it that is safe and he puts the other persons box safely also and for another one like that...He won't mix them up." (Maria, F, S+) • "[If the HCW handles the sample,] I am sure that it has been delivered to the right place." (Patrick, M, S-)	
Access and resources†	Transportation costs	• "The issue is transport...okay it is money, sometimes it may be difficult because you don't have money to transport you." (Prossy, F, S+)	• A1. Requesting SCS materials • A2. Receiving SCS materials/collecting a sample • A4. Receiving test results
	Proximity	• "I can't move for long distances. So you may tell me that where I am supposed to pick them there is a distance which I will not be able to manage." (Jane, F, S-)	
	Service hours	• "Here in the community it may be easy because here you can go there whenever you want even if it is in the night you can go and get it; which isn't the same with a hospital because for them they have hours they open and hours on which they close." (Ponsiano, M, S+)	
	Partner dynamics	• "Here are some men who don't allow their wives to leave home." (Fausta, F, S-)	

	User-friendliness and ease of use	• "The phone is easy to understand." (Sophia, F, S-)	
Time	Expedited service delivery	• "[A phone call] is faster, I can get the things very fast and then leave fast." (Ronald, M, S+) • "[A phone call] is convenient...it gives you quick information." (Sophia, F, S+).	• A1. Requesting SCS materials • A3. Returning samples to the lab • A4. Receiving test results
	HCW delays	• "Sometimes the prespecified location may have a health worker who might be busy on that day that you may want treatment that way he may not be able to come to you." (Patrick, M, S-) • "You might go to see a health worker when he has his own programs…sometimes it could be that he doesn't have the time so he will opt to give you another appointment." (Godfrey, M, S+)	
	Bureaucracy	• "[Using my phone,] I am able to call [the HCW] to bring those materials faster; basically in time. If I go there myself, they may make me go through processes and steps, yet there are many steps." (Richard, M, S+)	
Responsibility and courtesy‡	Health as a personal responsibility	• "As a person who wants to self-test it's my responsibility to go there rather than sending someone to bring for me." (Rose Mary, F, S+) • "It is not good to inconvenience someone every time you look for medicine." (Immaculate, F, S+)	• A2. Receiving SCS materials/collecting a sample • A4. Receiving test results • A5. Receiving treatment
	Respect and consideration for the HCW	• "I would prefer picking [the sampling materials] myself because sometimes you also give *musawo* a hard time...by making him/her personally coming to your home all the time." (Prossy, F, S+) • "Personally I would go and receive the results…[if the HCW comes to my home] that means she will pick the samples and also come back to deliver the results; it will be	

	tiresome for her that's why I will go and receive it myself." (Milly, F, S+)

HCW= Healthcare worker; SCS= self-collected sample; *musawo*= doctor; *basawo*= doctors
*Participants are identified by a pseudonym, their gender (M: male; F: female) and symptom status (S+: self-reported symptoms; S-: no self-reported symptoms)
† This theme was more commonly discussed by women.
‡ This theme was exclusively described by women.

Below, we summarize the acceptability of each of the approaches for service delivery in relation to the aforementioned themes; participants are identified by a pseudonym, their gender (M: male; F: female) and symptom status (S+: self-reported symptoms; S-: no self-reported symptoms).

Facility-based Service Delivery

Going to a facility to complete testing activities was acceptable to participants. A variety of factors influenced the acceptability of facility-based service delivery. Some participants felt that completing testing activities on-site, at a facility would maintain confidentiality. As one man explained:

> *When you pick [the testing materials] yourself, there is confidentiality, no one knows what you're up to.* (Patrick, M, S-)

Completing activities at a facility could also circumvent community gossip, as this woman explained:

> *You see, our fellow community members/neighbors – when they notice that there is a health worker coming so often at your home they will start*

asking what problem you may be having. For example, they will start gossiping how the other time the health worker came and took you; but if I go myself, I don't have to explain to anyone... (Esther, F, S+)

Some participants also felt that it was important to see the HCW, in person. As one woman described it:

Talking to a person face-to-face is different from sending a message or phone call. (Angela, F, S+)

Going to a facility was also the only way participants felt that they could be certain that testing activities were completed correctly; this was especially true when it came to returning their samples for testing:

I would…prefer personally taking them...Because it's the only way I could know that the samples are safe. (Joyce, F, S+)

A few participants felt that facility-based treatment prevented others from consuming their medicine:

I can't send someone to pick for me the medicine. The health worker may have prepared for me a full dose but because the person I sent may be

having the same infection as mine she might decide to take some. (Joyce, F, S+)

Facility-based service delivery was also perceived to be more time-efficient by some, as it eliminated the middleman (i.e. the HCW or other program representative). As one woman explained:

I see as if we are wasting time…Imagine delivering the kit, taking it back for screening, and then [the HCW] calls to find out how I would prefer receiving treatment – according to me the difference is zero, that's why I will personally go there. (Anna Maria, F, S+);

Also, some participants felt that going on-site to complete testing activities would mean that they would finish faster. Finally, some found facility-based service delivery acceptable out of personal responsibility, and as courtesy to the HCW. As one woman stated:

It will be quite tiresome for the health worker [to deliver the service]; imagine coming home every now and then…If she doesn't get tired, she can bring it, but I can also go and pick the treatment myself. (Phionah, F, S-)

<u>Home-based Service Delivery</u>

Home-based service delivery was also acceptable to participants. Some participants found home-based service delivery acceptable because they feared gossip if they visited publicly known STI testing sites. As one woman told us:

> *I would prefer having [the materials/results/treatment] delivered at home by the health worker...those are private issues... [it is important to make] sure that no one gets to know about it...[Others] may go on spreading rumors telling whoever they come across that so and so has infections and when you hear about [it], you feel bad.* (Justina, F, S+)

Some participants who found it acceptable to complete testing activities at home appreciated the ability to consult with the HCW. If the HCW met them at home, participants felt that the HCW would give them "enough time to explain…about how [the SCS materials] are used." (Harriet, F, S-) This included repeating instructions if participants did not understand them, as one woman described:

> *If it is the health worker that has come [to your home]…he can explain [the process] to you or if you have not understood, can even repeat three times or five times and he remains not tired…if the health worker has come in person… [he] can repeat for you what you haven't understood.* (Maria, F, S+)

Also, some participants felt that home-based service delivery could “ease communication between the patient and the doctor” and build a “relationship” between them (Bosco, M, S+); home-based service delivery showed that the HCW cared for their patients, in a unique way:

> *[Home-based service] shows you have a connection with the health worker, he knows something about you, you call him, and he knows what is going on and he brings it…it shows [that] your health worker cares about you…he is responsible to you and cares about you.* (Hassan, M, S+)

Delivering a SCS/STI testing service at home also provided an opportunity for counseling that was unique to other approaches. As this man explained:

> *When [a HCW] comes home, he asks you how you feel, what your status is...even if he has not brought me medication, just checking on me is good enough to give me hope and courage.* (Denis, M, S+)

Completing testing activities at home gave some participants certainty that they were completed correctly and sent to the right place. This was a particular concern when it came to returning samples to the lab: some participants felt that at-home pick-up of samples by the HCW would avoid the risk that someone (either the participant themselves or a courier) would misplace or damage the

samples. Others felt that at-home pick-up of samples by a HCW would help prevent inevitable delays that were the result of the participant being confused about where samples should be taken. In addition, some participants felt that home-based completion of activities was more accessible and resource-friendly, as they did not require any additional travel time or cost on behalf of the participant. Home-based service delivery was perceived as easier for women whose husbands would not let them leave the house. As one woman explained:

> *When I tell him [my husband] that the* musawo *will always deliver my treatment [at home], he will not be suspicious because he is aware that you deliver it here.* (Fausta, F, S-)

Lastly, some participants found home-based service delivery to be acceptable felt that it was time-efficient; as one participant explained: with the HCW delivering the service at home, “you are sure that the health worker takes it to the right place and will also deliver it in time.” (Ponsiano, M, S+)

Service Delivery via Mobile Phone Communication

To complete testing activities, mobile phone communication was sometimes acceptable to participants. With respect to confidentiality/privacy and mobile phone communication, participants were of mixed opinion. Some found it acceptable to complete some of the testing activities via a phone call because it made them feel ‘free to talk,’ as this man explained:

When I come physically to your center, I might find there other people and I get shy....but if you are [on] a call, you don't physically see me so I am free to talk. (Denis, M, S+)

Others, however, did not agree with phone calls because they felt that it did not protect their secrets. To this end, participants were concerned about receiving a call in the 'wrong place':

The phone, the way voices move, where the person you're calling is, the place he/she is in, maybe a wrong place yet the matters are private or where one is calling from may be wrong. (Bernard, M, S-)

Partner dynamics also played a role; one woman explained that she would rather receive her testing information first, in private, and disclose to her partner later. Phone calls, she said, could make this difficult:

Sometimes it's better to know first and then disclose to your partner later…[if notified by phone] the health worker may call you when you don't have a safe place to speak from. (Teopista, F, S+)

A few participants were concerned about having messages read or received by the "wrong person" (Patrick, M, S-).

Access and resources also affected the acceptability of mobile phone communication. Some participants felt that mobile phone communication was easier in the event that they did not have transportation to access the SCS/STI testing service, on-site. Mobile phone communication was also cheaper than other approaches for service delivery, since it meant that participants did not have to pay for transport:

> *When I just place a telephone call, I will just use 700 shillings; however, if I travel to your office, I will need 10,000 shillings.* (Denis, M, S+)

Some participants found it acceptable to complete some testing activities via mobile phone communication rather than at home because, that way, they could complete them when they are not home. As one woman phrased it:

> *If you just came without calling me, you wouldn't find me around, see how you waste your fuel?* (Maria, F, S+)

In addition, mobile phone communication was perceived to be more accessible than postal mail or online approaches in terms of technological literacy: because participants interacted with phones more often, they were more open to using phones over postal mail or the internet. As one woman told us: phones were "eas[ier] to understand" (Sophia, F, S-). Lastly, participants who found mobile

phone communication acceptable felt that it was more time-efficient. They stated that mobile phone communication was more direct and resulted in faster service delivery, as this participant explained:

> *I can make a phone call at that moment directly to the responsible receiver; then it becomes much easier for me to receive [what I need]…It is faster, I can get the things very fast and then leave.* (Ronald, M, S+)

Service Delivery via Postal Mail

The delivery of services via postal mail was not very acceptable. Most participants questioned the confidentiality and privacy of postal mail. If the courier did not know what was being delivered, then participants felt more comfortable with the approach. If that was the case, then a few appreciated the fact that packages could be delivered surreptitiously. As one woman explained it:

> *[Postal mail is okay] because [the courier] delivers and hand it to you without the people getting to know.* Ekili muttu kimanyibwa nyinikyo *<whatever is in the package is only known by the owner>.* (Sophia, F, S-)

Nevertheless, most all participants felt that the other approaches were more confidential and private than postal mail. Postal mail also omitted interaction with the HCW; this omission was not favored by participants. Participants also did not trust the postal mail system. They felt that it was disorganized and were not

certain that testing activities would be completed safely, correctly or in time. As one man explained to us:

> *Mailing is not very trusted, they over-delay things most of the time, the quality of mailing is not good, taking it yourself is better.* (Hassan, M, S+)

Lastly, most participants perceived postal mail to be inaccessible, because the approach did not reach everyone and many people do not understand how to use it.

Service Delivery via the Internet

The internet was also not acceptable in our population. The internet was perceived to be neither confidential nor private. As one woman stated:

> *I would prefer to go where [the diseases] were screened from or the health worker to bring them at home…[this is] very good compared to the online, for [the testing process] is secret...* (Deborah, F, S-)

Some participants did not readily accept using the internet because it lacked HCW interaction. Some perceived the internet as inaccessible: only a few community members could afford smartphones to access the internet. The internet was neither well understood nor perceived as user-friendly among many participants, making it even more inaccessible.

Participant Preferences for Service Delivery

Table 8 summarizes participant's ultimate service delivery preferences. First, we did not find one approach that was most preferred; rather, we found that users' preferences changed in response to the activity that was being discussed. Despite this, we found that facility- and home-based approaches were most preferred, suggesting that a desire for confidentiality/privacy, as well as HCW interaction, most strongly influenced preference: the approaches that participants perceived to be either confidential/private and/or allowed for increased interaction with the HCW (e.g. home- and facility-based approaches) were preferred over those that did not allow for such circumstances (e.g. mobile phone communication, postal mail, internet). Finally, we found that women most often preferred a home-based approach, while men preferred home- or facility-based approaches equally as often. We found no meaningful differences when we compared the preferences of participants with and without STI-related symptoms (data not shown).

Table 8. Service delivery preferences among participants (n=36) by testing activity, with the most popular preference highlighted

		SCS/STI TESTING SERVICE DELIVERY APPROACHES*																	
		Facility-based			Home-based			Mobile phone			Postal mail			Internet			No preference/ Preference unclear		
		M	W	B	M	W	B	M	W	B	M	W	B	M	W	B	M	W	B
ACTIVITY**	A1	5	16	**21**	2	1	3	**7**	4	11	0	0	0	0	0	0	1	0	1
	A2	7	7	14	3	14	**17**	4	0	4	0	0	0	0	0	0	1	0	1
	A3	5	6	11	8	15	**23**	2	0	2	0	0	0	0	0	0	0	0	0
	A4	2	5	7	10	13	**23**	3	3	6	0	0	0	0	0	0	0	0	0

	A5	8	9	**17**	4	12	16	2	0	2	0	0	0	0	0	0	1	0	1

M= Men, W=Women, B=Both men and women
*Facility-based: on-site request/pick-up/drop-off of SCS materials by the user at a predesignated facility such as clinic, hospital, pharmacy, medical camp, school or some other location; Home-based: request/pick-up/delivery of SCS materials to the user's home via a HCW or some other representative; Mobile phone: phone call or text message communication to facilitate the request/pick-up/drop-off of SCS materials; Postal mail: using the postal mail system to facilitate the request/pick-up/drop-off of SCS materials; Internet: using the internet to facilitate the request/pick-up/drop-off of SCS materials; No Preference/Preference unclear: user indicated either no preference or the user's preference was not clear
**A1: Requesting SCS materials; A2: Receiving SCS materials/collecting a sample; A3: Returning samples to the lab; A4: Receiving test results; A5: Receiving treatment

6.5 Discussion

With the exception of postal mail and the internet, we found that all approaches for SCS/STI service delivery were acceptable to different degrees, for different reasons: facility- and home-based service delivery were the most acceptable, while postal mail and the internet were the least acceptable. Though we did not find one, most preferred approach for service delivery, we found that both men and women's desire for confidentiality/privacy during the testing process, as well as the ability to interact with a provider, most strongly affected their preference. The prominence of these two themes helps to explain our overall finding that home- and facility-based approaches (which more readily allow for confidentiality and HCW interaction, in different ways) were more acceptable and preferable over mobile phone communication, postal mail and the internet.

To our knowledge, this is the first study to comprehensively explore user acceptability of and preferences for the delivery of a SCS/STI testing service in a low-resource setting. In a systematic review of patient experiences with SCS in middle- and high-income settings, Paudyal et al. found that across studies, 65%

of participants preferred to self-sample at home, versus 44% in the clinic.[52] One of the included studies assessed the validity, feasibility and acceptability of SCS versus HCW-collection in a low-resource setting in South Africa. The authors found that, among women who self-collected, most thought that women should be able to self-collect at home and then take the sample to the clinic.[157] The most frequently mentioned reasons for choosing SCS at home were that it can be done “in full privacy in one’s own time” and circumvents clinic waiting times. Another study in the United Kingdom asked sex workers to provide tampon samples for STI testing.[158] The authors found that women preferred being tested away from clinics because of ‘embarrassment,’ ‘convenience,’ ‘clinic wait times,’ and other logistical reasons. These themes are similar to those found in our data.

We can also draw upon lessons learned from other self-testing methods in SSA, such as HIV self-testing (HIVST). While users can conduct HIVST independently (i.e. they do not have to send samples to a lab for testing) and collect the sample differently (i.e. they collect an oral or fluid sample rather than a genital swab), the delivery of an HIVST service still requires a distribution model to provide test kits to users. An HIVST service also needs to link users to care and treatment, if necessary. In this way, some service delivery considerations (like where, when and how to complete testing activities) are similar between HIVST and SCS/STI testing.

In Malawi and Zambia, a series of discrete choice experiments were conducted to inform HIVST service delivery.[159,160] When asked about their distribution preferences, adults preferred to receive HIVST at home or at a distributor's home, rather than at mobile clinics (and drugstores in Zambia only). HIVST price also had a strong negative influence on acceptance. The study also found that for linkage to care, participants preferred a phone call over text message, a personal visit or no follow-up. These findings are similar to ours, in the sense that preferences changed response to the task to be completed (i.e. preference for home- or facility-based approaches to receive test kits and mobile phone communication or home-based approaches to be linked to care) as well as the desire for in-person communication. In both studies, too, access to financial resources affected user service delivery preferences. Another discrete choice experiment conducted in rural Zimbabwe aimed to asses user preferences of HIVST distribution models in order to optimize HIVST uptake.[161] The authors found that the strongest preferences were for (1) free kits, (2) (at home) door-to-door delivery of kits versus collection from a public/outreach clinic, (3) a telephone helpline for pretest support relative to in-person or no support, and (4) distributors from their own/local village versus those from external areas. The study also found that the strongest preferences for linkage to confirmatory testing – an activity analogous to receiving results and treatment in a SCS/STI testing service – were for immediate treatment, free services and proximity to the clinic.[160] Once again, we see that users preferred a mix of service delivery

approaches. We also see similar themes to our data, including the importance of direct and indirect costs (i.e., resources), time, stigma and the need for privacy.

Finally, in a review exploring the evidence for scale-up of HIVST in SSA, Indravudh et al. reported varied service delivery preferences by population group: a general population in Kenya valued enhanced accessibility and preferred a fee-based, pharmacy model for service delivery; individuals in Uganda and South Africa valued professionalized care and preferred to obtain HIVST kits from health facilities; young people in Malawi and Zambia valued confidentiality and cost and preferred at-home service; men in Uganda valued convenience and flexible hours of operation considering their work demands, and preferred picking up HIVST kits on-site at lodges and bars.[162] These data further corroborate our finding that individuals are different: they have different preferences and different considerations that are important to them, though common themes may exist.

This study had several strengths. By using qualitative, semi-structured interviews, we gave the participants time and space to provide rich descriptions on the advantages and disadvantages of each approach, as well as detailed rationales for their preferences. Despite this strength, using a qualitative approach also had limitations. In our study, we did not systematically compare the approaches against one another, and so we are not able to provide a measurement of their relative importance in the way that a quantitative survey could. We also did not evaluate the acceptability of service delivery approach

combinations. We recommend future researchers use quantitative methods, such as discrete choice experiments, to further explore user preference.

We also acknowledge that a SCS/STI testing service has never been implemented in our population. While participants did self-collect a sample in our study, they did not complete any of the other SCS/STI testing activities. As such, it is possible that the preferences participants' reported to us may change after they actually use a SCS/STI testing service; in other words, that revealed preferences may differ from stated preferences.[142,143]

Lastly, while the selection criteria for our participants was a strength, it was limited. Given the social and economic differences between men and women in SSA, we suspected a priori that men and women may have different service delivery preferences; as such, we specifically sampled both males and females from the general population in order to capture any differences in preferences or themes between the two. We also included participants with and without STI symptoms in the event that a future testing service may want to prioritize one group over the other. While we gathered a rich body of data from participants selected on these criteria, our study results do not necessarily represent the interests of other specific groups. For instance, we did not sample based on socioeconomic status. It is possible that, due to a lack of resources, persons of lower income may have service delivery preferences that are unique to other income groups. It is also possible that persons with more high-risk or transitory

occupations (e.g. sex workers, truck drivers, fisherfolk), or those who are HIV-positive, may have different service delivery preferences than the general population. We recommend future studies explore the perspectives of users from a variety of social and economic backgrounds.

6.6 Conclusion

SCS/STI testing is a promising additional method for STI diagnosis in low-resource settings and many possible approaches to service delivery exist. In our study, we found that there is no one-size-fits-all approach for SCS/STI testing service delivery. Much like any other service, individual choice for service delivery is critical, yet common themes – such as confidentiality and HCW interaction – are present. We recommend public health guidance provide for different approaches for SCS/STI testing service delivery, in order to make the service acceptable to the larger population.

Chapter 7. Conclusions

7.1 Summary of findings

7.1.1 Treatment seeking (Aim 1)

Aim 1 focused on treatment seeking behavior and SCS as a means to improve STI diagnosis in Uganda and other low-resource settings. Results from Aim 1 described current treatment seeking behavior among adults with STI-related symptoms and identified factors associated with seeking clinic treatment. Fifty-three percent (962/1825) of participants in the STIPS study reported that they experienced STI-related symptoms in the past six months. Of these, 57% (545/962) reported seeking any treatment for their symptoms. Among men and women, the likelihood of seeking any treatment was similar between genders and did not differ by community type. The majority of participants who sought treatment reported seeking treatment at only one location; private clinics were the most common location visited among both men and women. Women were less likely to seek treatment at a private clinic (versus a government clinic) than men (PRR: 0.75, p=0.00, 95% CI: 0.66-0.85). For both men and women, those in fishing communities were more likely to seek treatment at a private clinic (versus a government clinic) than those in inland communities (men: PRR: 1.25, 95% CI: 1.03-1.52; women: PRR: 1.68, 95% CI: 1.37-2.06). Forty-eight percent (457/962) of participants who reported STI-related symptoms in the past six months reported seeking treatment at a government or private clinic for their symptoms. For men and women, we found no difference in the prevalence of clinic treatment by gender (47% males; 48% females; PRR: 1.02, 95% CI: 0.88-1.18) or by

community type (48% inland communities; 47% fishing communities; PRR: 0.98, 95%CI: 0.78-0.86). Though only marginally significant, we found that men in fishing communities were less likely to seek clinic treatment than men in inland communities (PRR: 0.78, 95% CI: 0.61-1.00). Factors independently associated with clinic treatment seeking for men included being from the inland community and having multiple STI-related symptoms. For women, the only significant factor was having multiple STI-related symptoms. We also found that, approximately one-third of men and women who previously reported seeking clinic treatment for their symptoms were diagnosed with at least one curable STI (CT, NG, TV or active syphilis) at the time of the STIPS survey. When we analyzed the association between previous clinic treatment and current prevalence for any curable STI, we found no significant association, for either gender.

Our estimates differed from those gathered in the DHS as well as those from the first rounds of the RCCS in the mid-1990s. This can be partially explained by the types of communities that we selected for our study: as aforementioned, STIPS communities were selected to represent the diversity of communities in the area. However, our included communities are rural and so our estimates of treatment seeking cannot be compared to DHS estimates, which are aggerated for both urban and rural communities. We also cannot directly compare our findings to those from the first rounds of the RCCS due to the differences in study communities and time. Regardless, our findings suggest that approximately half of adults with STI-related symptoms in our study communities are not seeking

appropriate treatment. These persons may be spreading infection in the population and are a public health priority. We recommend researchers investigate barriers to treatment seeking and urge decision-makers to focus efforts on increasing appropriate care seeking in this, and similar, settings.

To our surprise, we did not observe a difference in clinic treatment seeking between men and women. Research in low-resource settings has described a gender difference in STI treatment seeking, with women less likely to seek any and/or prompt treatment as compared to men; [38,39,84–86] factors associated with this included prevailing gender norms, lack of time or money, lack of access to facilities, as well as the misattribution of symptoms or symptoms being perceived as normal or mild by women. Besides cultural differences, we have no reason to believe that such factors would not also apply to our study population to some degree. We recommend researchers continue to assess for a gender difference in treatment seeking and generate data in similar contexts to which we can compare our findings.

We were also surprised not to find any difference in treatment seeking between the two communities overall, though we did observe a difference in clinic treatment seeking among men of different communities. Fishing communities are epidemiologically different than inland communities in a variety of ways;[21,69,102,103] compared to inland communities, fishing communities exhibit distinguished social, behavioral, demographic and structural characteristics – including high

levels of HIV, mobility, risky sexual behavior (e.g. transactional sex, multiple partnerships), alcohol use and a high population of men.[69,163–165] Despite the efforts of numerous PEPFAR-funded HIV prevention activities, uptake of HIV services in fishing communities has historically been low (though this has been increasing in recent years with significant new service provision),[103] suggesting that there may be socio-ecologic factors beyond the availability of services that affect the uptake of care and treatment services. While we cannot say for sure, we can speculate that some of the socio-ecologic factors that prevent HIV service uptake in Rakai – transport costs, stigma, no available time to seek care, poor quality services[105,106,166] – could also affect clinic treatment seeking for STIs. Furthermore, studies have shown that fisherfolk engage in lifestyles of high risk-taking and hyper-masculinity;[165] we thus might expect fisherfolk (especially fishermen) to be less likely to admit that they are sick and vulnerable (even if they experienced symptoms), and also less likely to seek care for their symptoms than non-fisherfolk. Given this data, we expected that the prevalence of clinic treatment seeking among men in the fishing community would be lower than that among men in the inland community, and so, we were not surprised by our results. What did surprise us, however, was that community type did not affect clinic treatment seeking among women. We recommend researchers further explore the intersection of gender and community type, as well as try to better understand the barriers to treatment seeking among men in fishing communities.

We also observed that a significant majority of participants sought treatment at private clinics as opposed to government clinics, particularly in the fishing community. Given the rise in the number of private clinics in the country since the 1980s, this observation was not surprising.

We were also not surprised by the factors that we found to be independently associated with clinic treatment for men and women. We did, however, wonder why other factors that have been associated with clinic treatment seeking – such as higher education, increasing age (among women), and being HIV-positive – showed no significant association in our population. Data limitations, as well as culture, the availability and affordability of services and/or stigma may explain why these factors showed no association in our study. We recommend researchers continue to explore and characterize factors associated with clinic care seeking in low-resource settings.

Finally, we expected that previous clinic treatment seeking would be associated with significantly lower rates of current STI infection, for curable STIs. However, our analysis showed no difference in the current prevalence of any curable STI when we compared those who previously sought clinic treatment versus those who did not, for either gender. Assuming that seeking treatment meant receiving and completing appropriate treatment, these data could indicate that reinfection rates were high, treatment was inadequate, or both. We recommend that future studies explore the temporal association between previous STI treatment

seeking and current STI prevalence in order to assess for treatment effectiveness.

7.1.2 Acceptability of SCS (Aim 2)

Aim 2 explored the acceptability of SCS for STI testing. We interviewed 36 STIPS participants from the inland community, both with and without STI symptoms, about their experience self-collecting a sample. We supplemented user data with KI interviews for added context. We found that adults valued their health and the condition of their lives and they participated in STIPS STI testing because they wanted to ascertain their disease status and ‘know how they stand’ for the betterment of their health. Overall, we found that participants did not have a problem with SCS and they did not perceive the process to be physically uncomfortable. Perceived advantages of SCS included increased privacy and confidentiality and gentleness, as well as the idea that SCS were best if resources were limited. Perceived disadvantages included the lack of HCW involvement, fear of self-harm and the idea that SCS was unhygienic. We found that most participants preferred HCW-collected samples to SCS (18/36 [50%] for HCW versus 13/36 [36%] for SCS; 5/36 [15%] with no preference). Regardless of their preference, however, we found that participants would still recommend self-collection to others and would do it again in the future.

Because SCS for STI testing is not commonly implemented in low-resource settings, comparative data on its acceptability in a general population in such

settings is limited. Studies from high-resource settings indicate that SCS are highly acceptable.[46–55] In low-resource settings, trials on the acceptability of HPV self-sampling among women or HIVST among both men and women indicate similar advantages to those that we observed. Our study findings differ from the findings of studies conducted in high-resource settings, which indicate that participants prefer SCS to HCW-collection. However, when we compare our findings to similar self-care movements in low-resource settings (e.g. HPV self-sampling, HIVST in SSA), we see similar trends: adults prefer HCW-collection out of concern that they may take a bad sample or will do it incorrectly if they do it themselves. Our finding indicating that participants would recommend the method to others and do it again was reassuring, and has been observed in other study settings, too.

7.1.3 Service delivery (Aim 3)

Findings from Aim 3 of this dissertation identified user SCS/STI testing service delivery preferences. We conducted interviews with 36 adults from the inland community who self-collected a sample for STI testing in the STIPS, and found that the acceptability of various approaches for service delivery varied. To complete testing activities, facility- and home-based approaches were most acceptable, mobile phone communication was sometimes acceptable, and postal mail and the internet were not acceptable. While we found that a number of factors informed participants' acceptance of the various approaches – including privacy and confidentiality; HCW consultation and counseling (HCW interaction); certainty; access and resources; time; and personal responsibility and

professional courtesy to the HCW – we observed that confidentiality/privacy and HCW interaction most strongly influenced participant choice. Though we did not find one, most preferred approach for service delivery, we found that both men and women most often preferred home- and facility-based approaches, which they perceived to be more confidential/private and interpersonal than other approaches (e.g. mobile phone communication, postal mail, the internet).

To our knowledge, this was the first study to comprehensively explore service delivery preferences for a SCS/STI testing program in a low-resource setting. Our findings are similar to those of studies conducted in high-resource settings, which found that users prefer home-based services for reasons of increased privacy and convenience. We can also compare our results to those from studies focused on HIVST service delivery, which found that service delivery preferences differed for different activities, as well as differed for different populations. Similar to our results, findings from HIVST studies highlight the importance of direct and indirect costs, time, and stigma, as well as the desire for privacy and provider interaction.

7.2 Strengths and limitations

An overall strength of this dissertation was its novel focus on treatment seeking behavior and SCS as means to improve and expand STI diagnosis in a low-resource setting. Moreover, to our knowledge, this was the first population-level assessment of STI treatment seeking behavior in Uganda, beyond the DHS,

conducted since the 1990s. This was also the first study to assess the acceptability of SCS using penile-meatal swabs among men in a low-resource setting, as well as the first study to comprehensively explore user service delivery preferences for a SCS/STI testing service in a low-resource setting.

With regard to treatment seeking (Aim 1), calls have been made to broaden the research perspective in order to understand sexual healthcare seeking behavior.[43] Our study answered these calls through its population-based sampling approach: by sampling all eligible individuals within each community, we included both those who previously sought care at a clinic as well as those who did not. This allowed us to estimate clinic attendance as well as non-attendance, which is not common in other studies. Despite this, our findings may still be subject to measurement bias: inclusion criteria for our study relied on participant self-report of their symptoms and we classified participants based on their self-reported treatment seeking behavior. These self-reported data may have been affected by recall or social desirability bias. We also did not include psychologic or structural factors, such as the perception of symptoms, perception of health services, availability of health services, service quality or socioeconomic status, in our analysis; the inclusion of such variables could help explain our findings further. Finally, while we were sufficiently powered to address our main research questions, we may have been underpowered to assess for any differences in treatment seeking by both gender and community type.

With respect to SCS (Aims 2 and 3), studies that assess SCS acceptability in low-resource settings, especially among men, are rare. Our study was unique in that we included both men and women in our sample. By providing participants the opportunity to self-collect a sample, we were able to gather detailed and practical feedback on ease of use and their experience. Using qualitative methods, rather than quantitative methods, also allowed us to explore the nuances of participant acceptability and search for emerging themes. From a programmatic perspective, sampling based on gender and symptom status was an additional strength: gathering the perspectives of these different groups allowed us to assess for any meaningful differences between them. This information can help decision-makers prioritize resources and focus future interventions. Nevertheless, our study was not without limitations. Regarding the acceptability of SCS, it is possible that social desirability bias affected our results. We also did not sample participants based on socioeconomic status or age – these factors could influence SCS acceptability and sampling on these strata could inform our findings further. Regarding service delivery, our study relied on stated preferences; because participants operated within a hypothetical understanding of SCS/STI testing activities, it is possible that revealed preferences will differ from stated preferences once individuals actually experience the activities. Again, we did not sample high-risk groups or those of different socio-economic statuses. These groups may have preferences that differ from those we observed. Finally, because we did not assess preferences systematically, we are not able to present a ranking order of participant

preferences, and rather, can only present data on which approach for service delivery could work and potential reasons why.

7.3 Implications for practice

With STI cases rising in settings that have successfully implemented HIV combination prevention programs (particularly PrEP),[1–3] countries like Uganda need to be prepared to combat a similar trend. Accurate and timely STI diagnosis is critical to STI control. Improving and expanding STI diagnostic services will be essential in the event that STIs rise in Uganda and similar low-resource settings.

Prompt and appropriate STI diagnosis and treatment can lower the duration of infectiousness and limit the spread of disease.[5] In this context, it is important for STI control programs to understand a population's treatment seeking behavior. In Aim 1, we found that nearly half of adults with STI-related symptoms were not seeking appropriate treatment. This is a cause of concern, as untreated cases risk spreading infection to others in the population. Given the fact that they present with symptoms (and are thus easier to detect than asymptomatic cases), individuals reporting STI-related symptoms are 'low-hanging' fruit in terms of STI control; in a resource-limited setting, these individuals can be prioritized: resources can be focused to target such individuals first, getting them diagnosed and on treatment in order to avoid infection spread. We recommend researchers explore barriers to treatment seeking in this, and similar populations.

We also found that there is still a high proportion of STIs among those who have reported previously seeking clinic care, suggesting poor management of STI disease, high reinfection rates, or both, in this population. We urge decision-makers to quickly focus their attention on methods to increase appropriate STI diagnosis and treatment in this setting now, before STI burdens increase.

SCS/STI testing can also facilitate accurate and timely STI diagnosis, particularly in settings where syndromic management is the standard of care and there may be barriers to clinic-based diagnosis.[128] With an improved infrastructure and increased laboratory capacity thanks to HIV prevention efforts, Uganda and similar low-resource settings stand ready to shift toward etiologic testing for STI diagnosis. Using findings from this dissertation, program-planners and decision-makers can assess the potential of SCS as a means to expand STI diagnosis and control efforts. In Aim 2, we found that SCS is acceptable among users, but there is hesitancy to use SCS over HCW-collection. We recommend that our findings from Aim 2 be used to support the design of health education and communication campaigns to increase SCS uptake. For instance, program-planners can design SCS-promoting messages that emphasize individual health and life, confidentiality and privacy, as well as assure users of the low risks associated with SCS. Successful uptake of a SCS/STI testing service also requires a service delivery model that is acceptable to users. In Aim 3, we found that some approaches for service delivery are more acceptable than others for different reasons and individuals vary in their service delivery preferences.

Nevertheless, we observed a common desire for confidentiality and HCW interaction, making home- and facility-based approaches more appealing than other approaches, to all participants. We recommend program-planners take this data to mean that, like most services, individual choice is critical for SCS/STI testing service delivery; nevertheless, some common themes exist. We recommend public health guidance provide a variety of strategies for SCS/STI testing service delivery in order to make the service acceptable to the larger population.

7.4 Recommendations for future research

Concerning treatment seeking behavior for STI-related symptoms in low-resource settings, a number of questions still remain. First, we recommend researchers explore barriers to treatment seeking so that we can understand why treatment seeking behavior was so low in our population. Second, we recommend researchers to assess the influence of psychosocial and socio-contextual factors on treatment seeking behavior in SSA. We especially recommend an investigation of the health system and its organization in order to assess how the availability, accessibility and perception of various health services affect treatment seeking behavior in different low-resource populations and communities. Third, we also recommend future researchers collect data on the timing/order of treatment seeking and develop pathways models[5] to further differentiate treatment seeking behavior; such information can further guide the allocation of resources and future intervention development. Finally, we recommend researchers explore the temporal association between past

treatment seeking and current STI prevalence in order to assess for treatment effectiveness and/or possible reinfection rates in this population.

Our work regarding the acceptability of SCS/STI testing in a low-resource setting was exploratory; a number of other research questions exist. Results from our study suggest that SCS are acceptable and can be a potential means to expand STI testing in this setting. Further research should be conducted to better quantify this acceptability and measure its strength in different contexts and among specific target populations. With regard to service delivery, we recommend a series of discrete choice experiments to systematically assess user values and preferences for a SCS/STI testing service. We also recommend that researchers supplement our findings with studies assessing the capacity of health systems to rollout SCS/STI testing interventions. Pilot studies of SCS/STI testing interventions will also be critical to identify revealed preferences and optimal models of service delivery.

Chapter 8. Appendices

8.1 STIPS STI module (for females)

18-49 YEARS FEMALE STIPS QUESTIONNAIRE RCCS R19

Q.1 In the past 6 months, have you had any of the following health problems? **PROMPTED:** (Code in past 6 months column)
Do you have these symptoms now or have you had them over the past 7 days

(Code in current Column)	**Past 6 months**				**Current**			
	Yes	**No**	**DK**		**Yes**	**No**	**DK**	
Genital ulcer	1	2	7	{SXM1}	1	2	7	{CUR1}
Genital discharge	1	2	7	{SXM2}	1	2	7	{CUR2}
Thick and/or colored vaginal discharge	1	2	7	{SXM3}	1	2	7	{CUR3}
Itching of the vagina	1	2	7	{SXM4}	1	2	7	{CUR4}
Unpleasant vaginal odour	1	2	7	{SXM5}	1	2	7	{CUR5}
Frequent urination	1	2	7	{SXM6}	1	2	7	{CUR6}
Painful urination	1	2	7	{SXM7}	1	2	7	{CUR7}
pain during intercourse	1	2	7	{SXM8}	1	2	7	{CUR8}
bleeding during intercourse	1	2	7	{SXM9}	1	2	7	{CUR9}
lower abdominal pain	1	2	7	{SXM10}	1	2	7	{CUR10}
genital warts	1	2	7	{SXM11}	1	2	7	{CUR11}

If no to all the above, END

Q.2 Did you do anything to help cure these symptoms or to prevent passing on infection to your spouse/partner(s)?

Yes	1		**|_| {TMT}**
No	2	**-------->END**	
NR	9	**-------->END**	

Q.3 **If Yes to Q 2.** ask: What actions did you take?
PROBE and RECORD all RESPONSES

	Yes	No	NR	
Used condoms	1	2	9	{CON}
Abstinence 1		2	9	{ABS}
Sought treatment for self	1	2	9	{SLF}
Sought treatment for partner	1	2	9	{TMTSPS}
Other action	1	2	9	{OTHERACT}
Specify)_____				{OTHACT Memo}

IF RESPONDENT DID NOT SEEK TREATMENT FOR SELF, END

Q.4 Where did you go for treatment?
(PROBE and RECORD up to 3 RESPONSES)

Pharmacy/Drug store	01	**|_|_| {TRTSTD1}**
Market/shop	02	
Rakai Project Clinic	03	**|_|_| {TRTSTD2}**
Govt. doctor/nurse/clinic	04	
Prvt. doctor/nurse/clinic	05	**|_|_| {TRTSTD3}**
Traditional healer	06	
Other (specify _____)	07	**{OTHTRTSTD}**
Don't know	97	
No additional responses	88	

8.2 User interview guide

Note: *This guide is intended to be comprehensive of all questions that may be asked in these interviews, to provide a sense of the topics covered. We anticipate that not all questions will be asked of each participant, per the nature of in-depth qualitative interviews.*

NOTE TO INTERVIEWER:
Refer to the following table or IDI flow diagram in order to identify the applicable module.

STI-Related Symptoms?	Sought Treatment?	Self-Collected Sample?	Administer Modules:
Yes	No	No	1, 2, 4
Yes	No	Yes	1, 2, 4, 5
Yes	Yes	No	Do not interview
Yes	Yes	Yes	1, 2, 3, 5
No	-	No	Do not interview
No	-	Yes	1, 5

START RECORDING

NOTE TO INTERVIEWER:
State your name. Repeat.
State your ID number. Repeat.
State participant RCCS ID number. Repeat.
State interview start time and date. Repeat.

INTERVIEW START
Our study would like to learn more about your health and treatment seeking behavior.
Mukunonyereza kuno twagala okumanya ku byobulamu bwo nengeri gyononya obujajabi.

Module 1 – General Health Seeking.

Okunonya Obujajabi obwa wamu.
Let's start by discussing the types of health care services available in the community.

Katutandiike nokubaganya ebilowoozo ku bika byo bujajabi ebiri mu kitundu.

1. Can you please list for me the health care and treatment services that are available in the community? PROBE: PROBE: relief of symptoms, barriers to care.

   Kusaba omenyele ebika byempereza byo bujajabi ebiri mu kitundu kino?
   PROBE: relief of symptoms, barriers to care.

2. Can you describe each one to me in terms of access and service quality?
   PROBE: accessibility, distance, appeal (opinions/attitudes of each service), acceptability, quality, communication, cost, confidentiality, trust.
   Kusaba onyinyole ku buli mpereeza engeri gyozifunamu awamu no mutindo?
   PROBE: accessibility, distance, appeal (opinions/attitudes of each service), acceptability, quality, communication, cost, confidentiality, trust.

Now let's talk about the last time you were sick.
Katwogele ku mulundu gwe wasebayo okuba omulwadde.

3. Can you tell me more about your symptoms and what you did to feel better? PROBE: treatment seeking, source of care, social support.

kusaba obulileko obubonero bwo bulwadde lwe wasebayo okuba omulwadde ne kyi kyewakolawo okuwulira obulungi?
PROBE: treatment seeking, source of care, social support.

a) IF TREATMENT WAS SOUGHT: Can you tell me more about your experience with that source of treatment? What happened when you got there and how were you treated? PROBE: service quality, satisfaction with service, confidentiality.
OBA OBUJAJABI BWA FUNIBWA:
bulilako bye wayitamu ne jewafunira obujajabi?
Kyi ekyabawo bwe watukawo era wayisibwa otya?
PROBE: service quality, satisfaction with service, confidentiality

b) IF NO TREATMENT WAS SOUGHT: What were some reasons why you chose not to seek treatment? PROBE: relief of symptoms, barriers to care
OBA OBUJAJABI TWE BWAFUNIBWA:
Songa kyi ezakuletela okusalawo obutagenda kufuna bujajabi?
PROBE: relief of symptoms, barriers to care

[IF THE PARTICIPANT REPORTED STI-RELATED SYMPTOMS, ELSE SKIP TO MODULE 5]

Module 2 – STI Symptoms

Now we are going to talk more about your personal health.
Kati tugenda kwogera ku bikwatagana n'ebyobulamu bwo.

Sometimes, people experience uncomfortable symptoms like [FOR FEMALES: genital discharge, genital sores, itching of the vagina, unpleasant vaginal odor, frequent or painful urination, or pain during intercourse; FOR MALES: genital discharge, genital sores, frequent or painful urination, or pain during intercourse]. In the previous RCCS, you mentioned that you experienced one or more of these symptoms.

Ebiseera ebimu abantu bafuna obubonero bw'endwadde ne butabayisa bulungi, okugeza [FOR FEMALES: okubundula amazzi amabi okuva mu bifo by'ekyama, obubwa mu bifo by'ekyama, okusiiyibwa mu bifo by'ekyama, olusu olubi okuva mu bifo by'ekyama, okufuuyisa omusulo oguluma oba okufuuyisafuuyisa buli kadde, oba okulumwa nga weegatta, FOR MALES: okufulumya amazzi amabi okuva mu bifo by'ekyama, obubwa mu bifo by'ekyama, okusiiyibwa mu bifo by'ekyama, okufuuyisa omusulo oguluma oba okufuuyisafuuyisa buli kadde, oba okulumwa nga weegatta]. Mu kubuuzibwa ebibuuzo bya RCCS ebiwedde ku nkambi, wagamba nti wafunako obumu ku bubonero bw'endawadde buno.

4. Can you tell me more about the symptoms you experienced? PROBE: symptom recognition, symptom duration, symptom severity
Mbuulira ku bubonero bw'endwadde bwe wafunako. PROBE: symptom recognition, symptom duration, symptom severity.

    a. At the time, what did you think caused those symptoms?
    Mu kaseera ako, kiki kye walowooza nti kye kyaleeta obubonero bw'endwadde buno?
    b. At the time, what did you think would happen to those symptoms?
    Mu kaseera ako, kiki kye walowooza ekyaali kiyinza okubeerawo ku bubonero bw'endwadde obwo?
5. After you noticed your symptoms, what did you do? PROBE: changes in sexual behavior
Oluvannyuma lw'okulaba obubonero bw'endwadde buno, wakolawooki? PROBE: Wakyusa mu nneeyisa yo mu by'okwegatta?

6. Did you tell anyone about your symptoms? If so, who did you tell and what was their reaction? PROBE: family, friends, partner
   Olina gwe wabuulirako nga ofunye obubonero bw'endwadde buno?
   If so,
   Wabuulirako ani era yakuddamu ki?
   PROBE: family, friends, partner.

7. How are such symptoms viewed in the community? PROBE: partners, peers, community leaders, elders, religious organizations, any differences by gender.
   Ani gwe wabulirako kububonero?
   PROBE: partners, pers, community leaders, elders, religious organizations, any differences by gender

Our study would like to learn more about your health and treatment seeking behavior. Mukunonyereza kuno twagala okumanya ku byobulamu bwo nengeri gyononya obujajabi.

Module 3 – STI Treatment, Sought Treatment

In the RCCS, you also mentioned that you sought treatment for these symptoms. Mukubuuzibwa ebibuuzo ebiwedde kunkambi, (RCCS), era wagamba nti wanoonya obujjanjabi kububonero buno.

1. Can you tell me more about that decision? What was happening at that time; was there anything that helped you seek treatment? PROBE: facilitators to seeking treatment, services available but not chosen, services available and chosen, rationale for choosing service, previous treatment seeking experience

Nsaba okunnyinyonyoramu kuku salawoko?
Biki ebwaaliwo mukaseera ako?
Waliwo ebya kuyamba mukunoonya obujanjjabi?
PROBE**: abakuyambako okunonya obujanjjabi, empeereza eziriwo nayenga tezaakozesebwa, empeereza eziriwo era nga zakozesebwa, ensonga lwaki wasalawo okukozesa empeereza eyo, byewayitamu nga onoonya obujanjjabi.**

2. Other people have mentioned that certain factors like community and/or social stigma, confidentiality and/or privacy issues, poor access to the clinic, cost, etc. were barriers to seeking treatment for such symptoms. Do you think these issues affected you when you experienced those symptoms? Why or why not?

   Abantu abalala batugambyeeko nti ensonga nga abantu b'omukitundu ne/oba okutya okusongebwamu olunwe, okukuuma ebyama ne/oba esonga ezekuusa kubyaama, obuzibu bw'okutuuka ewajanjjabirwa, ebisale, etc. Byali bilemesa okunoonya obujanjjabi bw'obubonero buno.
   Olowooza bino byakutuukako bwewafuna obubonero buno?
   Lwaki oba lwaki nedda?

3. Other people have mentioned that certain factors like community and/or family support, peer groups, religious groups, access to the clinic, quality of services and patient care were facilitators to seeking treatment for such symptoms. Do you think these issues affected you when you experienced those symptoms? Why or why not?

   Abantu abalala batugambyeeko nti ensonga nga abantu b'omukitundu ne/oba okuyambibwaako ab'omumakaago, abekikoosi bo, ebenzzikiriza ezenjawulo, okutuuka ewajanjjabirwa, omutindo gwenpereeza n'abalwadde okufibwaako byaali biyambako okunoonya obujanjjabi bw'obubonero obwo. Olowooza bino byakutuukako bwewafuna obubonero buno? Lwaki oba lwaki nedda?

[IF THE PARTICIPANT REPORTED NOT SEEKING TREATMENT FOR STI-RELATED SYMPTOMS, ELSE SKIP TO MODULE 5]

Module 4 – STI Treatment, Did Not Seek Treatment

In the RCCS, you also mentioned that you did not seek treatment for these symptoms. Mukubuuzibwa ebibuuzo ebiwedde kunkambi, (RCCS), era wagamba nti tewanoonya obujjanjabi kububonero obwo.

4. Can you tell me more about that decision? What was happening at that time; was there anything that prevented you from seeking treatment? PROBE: barriers to seeking treatment, services available but not chosen, previous treatment seeking experience

   Nsaba okunnyinyonyoramu kuku salawoko? Biki ebwaaliwo mukaseera ako? Waliwo ebya kulemesa okunoonya obujanjjabi? PROBE: ebyakulemesa okunonya obujanjjabi, empeereza eziriwo nayenga tezikozesebwa, empeereza eziriwo era nga zikozesebwa, ensonga eyokusalawo okukozesa empeereza, byewayitamu nga onoonya obujanjjabi.

5. Other people have mentioned that certain factors like community and/or social stigma, confidentiality and/or privacy issues, poor access to the clinic, cost, etc. were barriers to seeking treatment for such symptoms. Do you think these issues affected you when you experienced those symptoms? Why or why not?

   Abantu abalala batugambyeeko nti ensonga nga abantu b'omukitundu ne/oba okutya okusongebwamu olunwe, okukuuma ebyama ne/oba esonga ezekuusa kubyaama, obuzibu bw'okutuuka ewajanjjabirwa, ebisale, etc. Byali bilemesa okunoonya obujanjjabi bw'obubonero buno. Olowooza bino byakutuukako bwewafuna obubonero buno? Lwaki oba lwaki nedda?

6. Other people have mentioned that certain factors like community and/or family support, peer groups, religious groups, access to the clinic, quality of services and patient care were facilitators to seeking treatment for such symptoms. Do you think these issues affected you when you experienced those symptoms? Why or why not?

   Abantu abalala batugambyeeko nti ensonga nga abantu b'omukitundu ne/oba okuyambibwaako ab'omumakaago, abekikoosi bo, ebenzzikiriza ezenjawulo, okutuuka ewajanjjabirwa, omutindo gwenpereeza n'abalwadde okufibwaako byaali biyambako okunoonya obujanjjabi bw'obubonero obwo.
   Olowooza bino byakutuukako bwewafuna obubonero buno?
   Lwaki?
   Oba lwaki nedda?

[IF THE PARTICIPANT SELF-COLLECTED A SAMPLE, ELSE END]
Module 5 **–** Self-collected Sample

Now, we are going to talk more about your recent experience in the RCCS. As part of the study, you were asked to provide a sample using a [vaginal/penile] swab for STI testing. Kati, tugenda kwongera okwogera ku biki bye waakayitamu nga obuuzibwa ebibuuzo bya RCCS ku nkambi. Ekimu ku byaliwo kwolwo, wasabibwa okwejjako ka ppamba okusobola okukeberamu endwadde eziva mu kwegatta.

7. Can you tell me more about why you decided to participate in the study and provide a sample for STI testing?
   Mbuulira lwaki wasazeewo okwetaba mu kunoonyereza kuno era noosalawo okwejjako ka ppamba n'okawaayo kakeberwemu endwadde eziyitira mu kwegatta?

8. [IF THE PARTICIPANT REPORTED NO STI-RELATED SYMPTOMS]
   Can you tell me more about what you know about STIs? PROBE: transmission, risk factors, symptoms, treatment
   Yongera ombuulire biki by'omanyi ku ndwadde eziyitira mu by'okwegatta?
   PROBE: transmission, risk factors, symptoms, treatment.

9. Please tell me more about your experience providing a sample. What were the positive aspects? What were the negative aspects? PROBE: ease of sample collection, comfort/discomfort, privacy, trust of results, any other concerns
   Mbuulira bwe wayisibwa ku ky'okwejjakoka ka ppamba n'okukawaayo. Kyalimu birungi ki? Wakisangamu buzibu ki?
   PROBE: ease of sample collection, comfort/discomfort, privacy, trust of results, any other concerns
   a. Would you have preferred for a clinician to collect the sample? Why or why not?
      Owulira wandyagadde omusawo yaaba akujjako ka pamba?
      Lwaki/lwaki nedda?

10. In your opinion, what do you think are the advantages and disadvantages of taking your own sample as compared to having a clinician take it? PROBE: time, cost, confidentiality, privacy, convenience, trust in results, stigma, patient-provider interaction
    Mu ndowoozayo, biki ebirungi awamu n'ebibi by'olaba ebiri mu gwe okwejjako ka ppamba bw'okigeraageranya n'omusawo okukakujjako?
    PROBE: time, cost, confidentiality, privacy, convenience, trust in results, stigma, patient-provider interaction
    a. If you were to provide a sample again in the future, would you prefer having a clinician collect it or collect it yourself? Can you explain your choice to me?
       Singa oli wakuwaayo ka ppamba omulundi omulala mu biseera ebijja, wandyagadde musawo y'aba akakujjako oba gwe okukejjako?
       Nyinnyonnyola lwaki ekyo kye wandyagadde.

11. If you don't mind, may I ask what were the results of your tests?
    Bwe kiba tekikuyisa bubi, nandyaagadde ombuulire ebyava mu kukebera ka ppamba kebakujjoko?
    a) Can you tell me more about the experience of getting your test results? How did you feel and what did you do? PROBE: personal reaction, social support, partner notification, treatment seeking and quality of services, any changes in sexual behavior.
       Nsaba ombuulire engeri gye wayisibwamu ng'ofunye ebyava mu kukebera ka ppamba.
       Muli wawulira otya,
       Era wakolawooki?
       PROBE: personal reaction, social support, partner notification, treatment seeking and quality of services, any changes in sexual behavior

       IF NEGATIVE: How would you have felt if you were positive for an STI? What would you have done? PROBE: personal reaction, social support, partner notification, treatment seeking and quality of services, any changes in sexual behavior.
       IF NEGATIVE: **Wandiwulidde otya singa wasangibwa nga olina endwadde eziva mu kwegatta?,**
       Kiki kye wandikoze?
       PROBE: personal reaction, social support, partner notification, treatment seeking and quality of services, any changes in sexual behavior

My last few questions relate to future STI testing programs. We are thinking about designing a program that provides STI testing services using self-collected sampling methods like the swab you took yourself. We would provide 'self-test kits' that have instructions and the tools to help you take a sample. Using a self-test kit could mean that you could test yourself for an STI without having to go to a clinic or be seen by a physician.
Ebibuuzo byange ebitono ebisembayo byekuusa kunkola ey'okukebera endwadde eziyitira mu kwekagata gyetuteekateeka mu biseera eby'omumaaso. Tulowooza okuteekateeka enkola e'yokwekebeza endwadde eziyitira mukwegata ngatukozesa enkola eyokwekebera nga bu pamba bwemwejako. Tujja kugaba ebikozesebwa mu kwekebera okuli endagiriro n'ebikozesebwa ebirara okwejjako ka pamba. Okukozesa enkola ey'okwekebera kiyinza okutegeeza nti oyinza okwekebera gwe kenyini obulwadde obuyitira mu kwegata nga togenze mu dwaliro oba okulaba omusawo.

To help us design a program that would best serve you, we need your honest feedback on what would and wouldn't work for you.
Okutuyambako okuteekateeka enkola enabayamba obulungi, twetaaga ebirowoozo byamwe eby'amazima ku kiki ekinabakolera oba ekitabakolere.

12. There are various ways that you could request a self-testing kit, how do you prefer to request a self-testing kit? Can you help me understand your choice? What about this way makes it most appealing to you?
    a. PROBE: opinion on requesting the kit in-person at a prespecified location like a clinic, pharmacy or other community site
    b. PROBE: opinion on requesting a kit online
    c. PROBE: opinion on requesting via the phone by text or phone call, etc.

13. There are also many ways to physically get the kit, how do you prefer to physically get a self-testing kit? Can you help me understand your choice? What about this way makes it most appealing to you?
    a. PROBE: opinion on picking up a kit at the clinic, a community location, school, religious organization or pharmacy
    b. PROBE: opinion on having a kit delivered to the home by mail or by a health care worker

14. To get your result, the samples you collect will have to be sent back to the lab for processing. There are many ways to do this, how do you prefer to send your samples to the lab? Can you help me understand your choice? What about this way makes it most appealing to you?
    a. PROBE: opinion on personally dropping off the sample at a prespecified location like a clinic, pharmacy or other community site
    b. PROBE: opinion on personally mailing the samples to a lab
    c. PROBE: opinion on having the samples picked up by health worker at their home

15. Now in terms of receiving your results, how do you prefer to receive your results? Can you help me understand your choice? What about that way makes it most appealing to you?
    a. PROBE: opinion on receiving the results by phone call, by text message, by mail, and/or online
    b. PROBE: opinion on receiving the results in-person at the clinic, pharmacy, lab or some other location
    c. PROBE: opinion on receiving the results at home by a health care worker

16. There are also a few options for how you would like to receive treatment if you tested positive, how do you prefer to receive treatment? Can you help me understand your choice? What about that way makes it most appealing to you?
    a. PROBE: opinion on delivery of treatment at home via a health worker

b. PROBE: opinion on picking up treatment in-person in the clinic or in the pharmacy

17. Thank you, you have provided us with some very useful feedback. If we were to design a program that used self-collection of samples for STI testing, considering the preferences you mentioned, would you use such a service in the future? Why or why not? PROBE: advantages/disadvantages, barriers, concerns, willingness to pay, willingness to recommend to others
Webale, otuwadde ebirowozo byo ebirungi era nga bya mugaso. Bwetuba nga tuli bakutekateka enkola e'yokwejjako bu pamba okukebera endwadde eziyitira mu kwegata, bwetutunurira ku nkola z'oyogeddeko ezisinga okukolera, wandikozeseza empereeza ezo gyebujja?
Nyonyola .
PROBE: **advantages/disadvantages, barriers, concerns, willingness to pay, willingness to recommend to others**

    a. Do you think such a program would meet your needs is there something else we could do to help you seek treatment for STI-related symptoms?
    Olowooza enkola eno enatukiriza eby'etaago byo?
    Waliwo ekintu ekirara kyona kyetuyinza okukola okuyamba okufuna obujanjabi bw'obubonero obw'endwadde eziyitira mu kwegatta?

This concludes my questions.

18. Is there anything else you would like to share or think is important for me to know?
Waliwo ekintu ekirara kyona kyewandyagadde okumbuliramu oba kyolowooza nti kyamugaso gyendi okumanya?

Thank you for participating.
Webale okwetaba mukunonyereza kuno.

INTERVIEW END
NOTE TO INTERVIEWER:
State interview end time. Repeat.

END RECORDING

8.3 Key informant interview guide

Note: *This guide is intended to be comprehensive of all questions that may be asked in these interviews, to provide a sense of the topics covered. We anticipate that not all questions will be asked of each participant, per the nature of in-depth qualitative interviews.*

START RECORDING

NOTE TO INTERVIEWER:
State your name. Repeat.
State your ID number. Repeat.
Describe type of key informant (health officer, physician, community health worker, etc.).
State interview start time and date. Repeat.

INTERVIEW START

Thank you for participating in this study. Our goal is to better understand treatment seeking behavior among adults with STI-related symptoms, in order to design STI testing interventions that meet their needs. We invited you to participate in this study based on your experience with [patients with STIs OR STI control programs in the community].
Webale kukiriza kwetaba mukunonyereza kuno. Ekigendererwa kyaffe kwe kutegera obulungi engeri abantu abakulu gye banonyamu obujajabi bwo bubonero bw' endwadde eziyitira mu kwegatta,kitusobozese okuteekateeka enkola e'yokwekebeza edwadde eziyitira mu kwegatta etukagana ne byetago byabwe. Walondedwa okwetaba mu kunoonyereza kuno okusizira kubumanyirivu bwolina ne [abalwaddwe abayina edwadde eziyitira mu kwegatta oba enkola eziziyiza edwadde z'obukaba mu kitundu].

Module 1
To start, let's focus on STIs and treatment seeking behavior among adults.
Nga tutandiika ,tugenda kutunulira obulwadde obuyitira mu kwegatta ne ngeri abantu abakulu gye banonya obujajabi

1. In general, what is the perception of STIs in the community? PROBE: knowledge of STI causes & transmission, perceived risk, stigma
   Okutwalira awamu ,edwadde eziyitira mu kwegatta abantu bo mu kitundu bazilowozako ki? PROBE: knowledge of STI causes & transmission, perceived risk, stigma

2. What care and treatment options are available for persons with STI-related symptoms?
   Bika bya bujajabi kyi ebiliwo eri abantu abalina obubonero bwe ndaddwe eziyitira mu kwegatta?

a. Can you describe each in terms of quality, cost and accessibility? PROBE: quality of services, availability of services, patient-provider interaction, trust, cost, access, distance
Nkusaba onyonyole ku mutindo gwo bujajabi obwo ,ebisale ne engeri

gyobufuna PROBE: quality of services, availability of services, patient-provider interaction, trust, cost, access, distance

b. What factors influence an adult's decision to seek one treatment provider over another PROBE: quality, cost, accessibility
Biki ebivirako omuntu omukulu okusalawo okunonya obujajabi okuva mubagabi bo bujajabi abenjawulo (i.e. obujajabi bwe kizungu oba obujajabi bwe kinansi)? PROBE: quality, cost, accessibility, (i.e. western medicine vs. traditional healer)?

3. In your experience, how do adults commonly react if they notice STI-related symptoms? PROBE: changes in sexual behavior, discussion with others/partner, average time to seek treatment, location and type of treatment
   Mu bumanyirivu bwo, abantu abakulu batela kweyisa batya oluvanyuma lw'okulaba obubonero bw'endwadde eziyitira mu kwegatta? PROBE: changes in sexual behavior, discussion with others/partner, average time to seek treatment, location and type of treatment

   a. Does this differ between males and females? Young and old persons? Persons of low or high Social economic status? Any other factor? How so?
      Kino kilina engeri gye kyawuka wakati wa basajja na bakazi? Abato na abakulu? Abantu ba embera yenfuna eri wansi oba eri wagulu? Waliwo ensonga endala yona? Kitya?
4. In your opinion, how common is it for adults to seek treatment if they have STI-related symptoms?
   Mu ndowooza yo, kyabuligyo abantu abakulu obutanonya bujajabi singa babeera no bubonero bw'eddwadde eziyitira mu kwegatta?
   a. Does this differ between males and females? Young and old persons? Persons of low or high social economic status? Any other factor? How so?
      Kino kilina engeri gye kyawuka wakati wa basajja na bakazi?Abato na abakulu? Abantu ba SES eri wansi oba eri wagulu? Waliwo ensonga endala yona? Kiri kitya?
5. We conducted an analysis among adults living in Rakai to see which factors are associated with NOT seeking treatment for STI-related symptoms. Our preliminary results found that certain factors like community and/or social stigma, confidentiality and/or privacy issues, distance to the clinic and cost, increased the odds of a person to not seek treatment. Does this make sense to you? Why or why not?
   Twakola okunonyereza ku bantu ababela mu Rakai okulaba biki ebiletela abantu obutanonya bujajabi bwo bubonero bw'endaddwe eziyitira mu kwegatta.Ebyavamu bilaga nti ensonga nga abantu b'omukitundu ne /oba okutya okusongebwamu olunwe,okukuuma ebyama ne/oba ensonga ezekuusa kubyaama,obuzibu bw'okutuuka ewajanjjabirwa,ebisale,etc byalemesa abantu okunonya obujajabi. Kino kikola amakulu gy'oli?Lwaki oba lwaki nedda
   a. Are there any other factors that you think will increase the chance that a person with symptoms will not seek treatment? PROBE: individual factors, interpersonal factors, community factors, health system factors, contextual/social factors
      Waliwo ensonga eddala gy'olowooza eyinza okulinyisa emikisa gy'omuntu alina obubonero obutanonya bujajabi? PROBE: individual factors, interpersonal factors, community factors, health system factors, contextual/social factors

   b. We also found that men are more likely to seek treatment for their symptoms than women, can you help explain why this is the case? **Era twakizude nti abami batera okunonya obujanjabi obw'obubonero bwabwe ekitali mubakyala, mbulirako lwaki kirikityo?**

6. From your experience, what are the major barriers to seeking treatment among adults with STI-related symptoms? PROBE: health care service quality, access and affordability, social networks, family dynamics, partner dynamics, social stigma

   Okusinzira ku bumanyirivu bwo, kiki ekisinga okulemesa abantu abakulu okunonya obujajabi bwo bubonero bw'endwadde eziyitira mu kwegatta? PROBE: health care service quality, access and affordability, social networks, family dynamics, partner dynamics, social stigma

a. Do these barriers differ between males and females? Young and old persons? Persons of low or high social economic status? Any other factor? How so?
Ebilemesa bino okunonya obujajabi byawuka wakati wa basajja na bakazi? Abato na abakulu? Abantu befuna entono oba abantu abalina ku nsente? Waliwo ensonga endala yona? Lwaki kili kityo

7. Based on your experience, what do you think would help facilitate an individual to seek treatment for STI-related symptoms? PROBE: health care service quality, access and affordability, social networks, family dynamics, partner dynamics, social stigma
Okusinzira ku bumanyirivu bwo ,kiki kyolowooza ekisobola okuyamba omuntu sekinomu okunonya obujajabi bw'endwadde eziyitira mu kwegatta PROBE: health care service quality, access and affordability, social networks, family dynamics, partner dynamics, social stigma

    a. Do females need anything different than males? What about younger versus older persons? Persons of lower social economic status versus higher social economic status? How so?
    Abakazi balina ekyenjawulo kyebetaga okusinga ku basajja?Ate abato ng'obageragerenya kubantu abakulu? Abantu abembera yenfuna entono ku abembera yenfuna eriwagulu?

8. In our study, we also found that both men and women had issues disclosing their symptoms and test results to others; for both men and women, persons did not often share this information with others. Can you help explain why this is the case?
Mukunonyereza kwaffe, twazudde nti abami na abakyala ebisera ebisings tebabuliko muntu yena ku bubonero oba ebivudde mukeberebwa. Mburilako lwaki kino kiri bwekityo?
    a. Some men and women were also hesitant to disclose their symptoms and test results to their partners, specifically. Can you help explain why this is the case?
    Abami abamu nabakyala tebagala kubulira bubonero bwabwe ne ebivude mukeberebwa eri abagarwa babwe. Nyinyonyolamu lwaki kino kiri bwekityo?

Module 2

Thank you, this information so far has been very informative. Another goal of the study is related to improving STI case management. To this end, I would appreciate your insights on current practice for STI case management.

Webale, ebirowozo bw'otuwadde bya mugaso.Ekigendererwa ekirala mu kunonyereza kuno kyekuusa ku kulongosa engeri edwaddwe eziyitira mu kwegatta bwezigonjolwamu. Kakati,nyaniriza endowoozayo ku ngeri endwadde eziyitira mu kwegatta bwezigonjolwa ensagi zino

9. Can you describe how STI are currently managed in thi community? PROBE: diagnosis, treatment, follow-up care
Kusaba onyonyole engeri endwadde eziyitira mu kwegatta bwezikwatibwa mu kitundu kino/Uganda? PROBE: diagnosis, treatment, follow-up care

    a. Does this differ by service provider? PROBE: western medicine, traditional healer, pharmacist, self-treatment
    Olowooza Kino kyawuka okusinzira obujajabi gy'bufunibwa? PROBE: western medicine, traditional healer, pharmacist, self-treatment

10. Please describe to me the syndromic management approach to STI case management.
Kusaba onyinyonyole ku nkola yokujajaba nga basinzira kububonero era enkola eno eyamba etya mukungojola ebizibu by'endwadde eziyitira mu kwegatta.
    a. Do you think this is a good approach to STI case management in this community? What works/is good about it? What doesn't work/is bad about it?

PROBE: asymptomatic patients, cost-effectiveness, misdiagnosis, antibiotic resistance, training of clinicians, patient access to services, linkage to care, loss to follow-up
Olowooza eno enkola nungi mukugonjola ebizibu by'endwadde eziyitira mu kwegatta mu kitundu kino ne Uganda yonna?ki ekikola/ oba ekilungi mu kola eno? Kiki ekitakole/oba ekibi mu nkola eno? PROBE: asymptomatic patients, cost-effectiveness, misdiagnosis, antibiotic resistance, training of clinicians, patient access to services, linkage to care, loss to follow-up

11. How common is laboratory testing for STI case management in this community?
Kyabulijjo okukebelera mu lab okugonjola ebizibu by'endwadde eziyitira mu kwegatta mu kitundu kino?
    a. What do you think are the barriers to widespread, routine lab testing for STIs in this community? PROBE: cost, availability of equipment, lab capacity, transportation requirements, linkage to care
    Olowooza biki ebilemesa okubunya enkola yokukeberebwa mu lab buli endwadde eziyitira mu kwegatta buli kiseera mu kitundu kino n? PROBE: cost, availability of equipment, lab capacity, transportation requirements, linkage to care

Thank you. The next set of questions relate to future STI testing interventions. Webale.Ebibuzo byange ebilala byekuusa kunkola ey'okukebera endwadde eziyitira mu kwegatta gyetuteekateeka mu biseera eby'omumaaso.

We are thinking about designing a program that provides STI testing services that use self-collected sampling methods. This would require a patient to somehow obtain a self-test kit that will include a self-administered swab, which they can use to collect a specimen from the vagina or penis. The swab will then have to be sent to the lab for testing and the results returned to the patient. By self-collecting a specimen, patients could test themselves for an STI without having to go to a clinic or be seen by a physician.
Tulowooza okuteekateeka enkola e'yokwekebeza endwadde eziyitira mukwegatta ngatukozesa enkola eyokwekwebera. kino kijja kwetagisa omulwadde okufuna ebikozesebwa mu kwekebera nga mulimu ka pamba ke banakozesa okwejjakko ebinakeberebwamu endwadde okuva mu bifo byabwe ebyekyama .Kapamba kebejjeko kajja kuwerezebwa mu lab okwekenenyezebwa era ebivudde mu kukeberebwa bijja kukomezebwayo eri omulwadde. Munkola eno ey'okwejako kapamba , abalwadde bajja kuba basobola okwekebera benyini obulwadde obuyitira mu kwegatta nga tebagenze mu dwaliro oba okulaba omusawo

I would appreciate your help to identify some details of such a program:
Twetaaga obuyambi bwo okusobola okulonda enkola enungi:

12. What is your initial reaction to this idea? What do you like about it? What do you not like about it or think would not work?
Ensonga eno ogyogerako kyi? Kiki kyojagalako? Kiki ekitakusanyusa ku nkola eyo oba kyolowooza ekitakole?
13. What types of patients do you think would benefit from such a program? PROBE: sex, social economic status, age
Balwadde bakika ki bolowooza abanaganyulwa mu ntekateeka eno? PROBE: sex, SES, age
    a. How do you recommend we engage with/reach such patients?
    Tukole tutya okulaba nga tutukirira abalwadde abo?
14. What are some ways that self-test kits could be made available to patients? PROBE: passive approach initiated by individual request in-person at a prespecified location, individual request online, individual request via phone call or text; active approach

initiated by public health practitioners via community health workers during home visits or community outreach, clinic staff at health center visits, pharmacy staff
Nkola kyi zetwandikozeseza okusobola okutusa ebikozesebwa okwekebeza endwadde ezobukaba eri abalwadde? PROBE: passive approach initiated by individual request in-person at a prespecified location, individual request online, individual request via phone call or text; active approach initiated by public health practitioners via community health workers during home visits or community outreach, clinic staff at health center visits, pharmacy staff

a. Which do you recommend and why?
Nkolaki gy'osazeewo era lwaki?
b. We have found that community members generally prefer requesting a kit over the phone or via a healthcare worker because of privacy reasons or to save time and money. Can you help me understand why this is the case?
Tukizudde nti abantu b'omukitundu abasinga bandyagade okusaba ebikozesebwa nga bayita mukukuba esimu oba oba okuyitira mu musawo olwensonga yo kukuma ebyama oba obutonona bisera ne sente. Nyonyola lwaki kino kiri bwekityo?

15. What are some locations where self-test kits could be made available? PROBE: at the clinic, at a community location (specify), at school, at a religious organization, at the pharmacy, at home (specify how – by mail, health care worker drop-off)
Bifo ki byolaba awasobola okutekebwa ebikozesebwa okwekebeza endwadde ezobukaba? PROBE: at the clinic, at a community location (specify), at school, at a religious organization, at the pharmacy, at home (specify how – by mail, health care worker drop-off)
    a. Which do you recommend and why?
    Nkolaki gy'osazeewo era lwaki?
    b. We have found that community members generally prefer having a healthcare worker deliver the kit to their homes because it saves time and money. Can you help me understand why community members feel this way?
    Tukizudde nti abantu b'omukitundu abasinga badyagadde omusawo weby'obulamu okubaletela ebikozesebwa ewaka kubanga kitasa ebisera ne sente.Nyonyola lwaki abantu b'omukitundu balowooza bwatyo?

16. How do you think individuals in this community who have STI symptoms would feel about doing a self- collected sample?
Olowoozaa abantu mu kitundu kino abalina obubonero bw'endwadde eziyitira mu kwegatta banawulira baatya okwejako ka pamba
    a. How do you think self-collection will be accepted in this community as compared to attending a clinic for STI case management?
    Olowooza enkola eyo kwekebera enekirizibwa mu kitundu kino bw'okigeraageranya no genda mu dwaliro okusobola okugonjola ebizibu by'endwadde eziyitira mu kwegatta
17. How do you think individuals in this community who do not have any STI symptoms would feel about doing a self- collected sample?
Olowooza abantu mu kitundu kino abatalina bubonero bwona obw'endwadde eziyitira mu kwegata banawulira batya okwejako ka pamba?
    a. We have found that community members generally like self-collecting a sample but some would still prefer having a clinician collect the sample because they feel clinicians are better trained. Can you help me understand why community members feel this way? **Tuzudde nti abantu b'mukitundu abasinga bagala okwejako bupampa naye abamu bandyagade omusawo yaba abakabajako kubanga omusawo mutendeke bulungi**

18. After collection, patient samples would have be sent back to the lab for processing. What are some options for sending the sample to the lab? PROBE: pickup by health worker at home, drop off specimen at prespecified location (specify), mail in
Oluvanyuma lw'okuganya ebijidwako ku mulwadde bilina okudizibwayo okwekenenyezebwa mu labu. Nkolaki ezandikozeseddwa okuzayo omulwadde byeyejeko okwekenenyezebwa mu labu? PROBE: pickup by health worker at home, drop off specimen at prespecified location (specify), mail in

    a. Which do you recommend and why?
    Nkolaki gy'osazeewo era lwaki?
    b. We have found that community members generally prefer having a healthcare worker pick up the kit from their homes because it ensures that the sample is taken safely and will reach the destination safely. Can you help me understand why community members feel this way? **Tuzudde nti abantu bomukitundu abasinga bandyagade omusawo okukima bwewejjeko ewaka kubanga bupamba bwebejeko bujakutwalibwa bulungi era butusibye bulungi gyebulaga. Nyonyola lwaki abomukitundu bawulila bwebatyo?**

19. What are some ways that test results could be shared with the patient? PROBE: by phone, by mail, online, in-person at the clinic, in-person at pharmacy, in-person at the lab, in-person at some other location (specify)
Nkolaki ezandikozeseddwa ebivudde mu kukeberebwa okusobola okutusibwa eri omulwadde? PROBE: by phone, by mail, online, in-person at the clinic, in-person at pharmacy, in-person at the lab, in-person at some other location (specify)

    a. Which do you recommend and why?
    Nkolaki gy'osazeewo era lwaki?
    b. We have found that some community members generally prefer having a healthcare worker deliver the results to their home or their go to the clinic for the results because of privacy reasons. Some preferred to have the results delivered by phone because it saves time and money. Can you help me understand why community members feel this way? **Tuzude nti abantu b'omukitundu abasinga bandyagade omusawo okubatusako ebivude mukukeberebwa ewaka oba okubifunira mu clinic olwensonga yo kukuma ebyama. Abamu bandyagade okufuna ebivude mukukeberebwa okuyitira kusimu kubanga kitasa obisera ne sente . Nyinyonyola lwaki abantu b'mukitundu bawulira bwebatyo?**
    c.

20. What are some ways to connect the patient to treatment if their result is positive? PROBE: at home delivery via health worker, self pick-up in the clinic, pharmacy, community location
Ngeri ki gy'etuyinza okukwataganya omulwadde awali obujajabi singa asangibwa n'endwadde eziva mu kwegatta? PROBE: at home delivery via health worker, self pick-up in the clinic, pharmacy, community location

    a. Which do you recommend and why?
    Nkolaki gy'osazeewo era lwaki?
    b. We have found that community members generally prefer having a healthcare worker deliver the treatment to their home or at a central community hub because it saves time and money. Some also don't mind to pick up the treatment at a local clinic or pharmacy. Can you help me understand why community members feel this way? **Tuzude nti abantu b'omukitundu abasinga bandyagade omusawo okubatusako obujanjabi ewaka oba kukifo ekirondedwa mukitundu kubanga kitasa ebisera ne sente. Abamu tebayina buzibu kufuna bujanjabi okuva ku bu clinic oba obuduka obutunda edagala mukitundu mwebabela. Nyinyonyola lwaki abantu b'omukitundi wawulira bwe batyo?**

21. What are some ways to engage the sexual partners of those that are positive in STI testing services?
Nkolaki zetuyinza okuyitamu okwogeraganya na bagalwa babasagiibwa n'endwadde eziyitira mu kwegatta?

    a. Which do you recommend and why?
Nkolaki gy'osazeewo era lwaki?

    b. We have found that partner mistrust is common, with some men and women not disclosing their test results to their partners or referring their partners to treatment because they fear being labeled as promiscuous. Can you help me understand why community members feel this way? **Tuzude nti abagalana obutesigangana kyabuligyo abasaja abamu na abakyala tebabulirako abagalwa babwe ku bivude mukukeberebwa oba okugamba abagalwa babwe kubanga batya okubayita abenzi. Nyinyonyola lwaki abantu b'omukitundu balowoza bwebatyo?**

Thank you, you have provided us with some very useful insight. I have a few last questions:
Webale ,otuwadde ebirowozo ebyomugaso. Ninayo ebibuzo bitono ebisembayo

22. If implemented, a self-collection for STI testing program would be offered in addition to the current standard of care. What do you see as the advantages of this additional service as compared to only offering the current standard of care? What do you see as the disadvantages? PROBE: advantages/disadvantage of those with symptoms, advantages/disadvantages of those without symptoms
Singa eletebwa,enkola yokwekebera endwadde eziyitira mu kwegatta eja kutekebwawo nga egattibwa ku mpereza eliwo kati.bilungi ki byolaba mu mpereza eno enaba eyogedwako bwokigeregeeranya ne mpereeza yobujajabi eliwo kati?Bibi kyi byokilabamu? PROBE: those with symptoms, those without symptoms

23. Do you have any concerns about such a program? Please describe.
Olina okwekegera kwona ku ntekateeka eno? Nyonyola.

24. How do you think the community would respond to such a program? PROBE: response of those with symptoms, response of those without symptoms. **Olowoza a'bomukitundu banajumbira entekateka nga eno?**

    a. a. We have found that community members are accepting of such a service and would be open to using it. However, the main issue is cost. Can you help me understand why community members feel this way? **Tuzude nti abantu b'omukitundu bakiriza empereza era betegefu okujikozesa naye ekikulu bisale. Nyinyonyola lwaki abantu b'omukitundu bawulira batyo?**

25. If the funding for STI testing and self-collection kits was available, do you think the health system is ready to implement an STI testing intervention that uses the self-collection of samples? Why or why not?
Singa obusobozi bwokusasulira okwekebera endwadde eziyitira mu kwegatta ne bikozesebwa mu kwekebera webiri,olowooza abakwataganya eby'obulamu betegefu okuteka mu nkola empereeza yokwekebera endwadde eziyitira mu kwegatta ?lwaki/lwaki nedda?

26. If the program was funded, what do you think would be the major barriers to successful implementation? PROBE: political will, health system capacity, trust, loss to follow-up, logistics issues, patient uptake of services

Singa etekateeka eno esasuliddwa,olowooza biki ebiyinza okusinga okugilemesa okutekwebwa mu nkola? PROBE: political will, health system capacity, trust, loss to follow-up, logistics issues, patient uptake of services

This concludes my questions.

27. Is there anything else you would like to share or think is important for me to know?
Waliwo ekintu ekirara kyonna kyewandyagadde okumbuliramu oba kyolowooza nti kyamugaso gyendi okumanya?

Thank you for participating.
Webale okwetaba mukunonyereza kuno.

INTERVIEW END

NOTE TO INTERVIEWER:
State interview end time. Repeat.

END RECORDING

Chapter 9. References

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Curriculum Vitae

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EDUCATION

Johns Hopkins Bloomberg School of Public Health
May 2015
Master of Science in Public Health (MSPH)
Department of International Health, Global Disease Epidemiology and Control program
Department of International Health
Thesis: Characteristics Associated with Mobile Phone Access among TB Characteristics Associated with Mobile Phone Access among TB Patients in Pune, India
Honors: Delta Omega Public Health Honor Society
GPA: 4.0/4.0

New York University
May 2012
Bachelor of Arts (BA)
Gallatin School of Individualized Study
Broadcast Journalism (major), Chemistry (minor)
Thesis: Science Communication in Broadcast & Multimedia Journalism
Journalism Honors Capstone: "Big kids," available from: http://bigkidsdoc.com/
Semester Abroad: Accra, Ghana, Fall 2010
Honors: Dean's List, 2008-2012
GPA: 3.81/4.0

PROFESSIONAL EXPERIENCE

Delaware Department of Health and Social Services
Dover, DE, USA
Epidemiologist IV, August 2020 – Present
CDC Foundation COVID-19 Corps

Principal responsibilities: Lead for SARS-CoV-2 surveillance in public and private schools, institutes of higher learning and childcare facilities across the state. Liaise between Department of Education, Department of Public Health and the Governor's Office to guide decision-making and focus the disease response. Provide data to guide local and state decision-making, including business and school closures and reopening. Oversee outbreak investigations. Lead on daily and weekly cluster detection reports to identify SARS-CoV-2 hotspots. Technical support for the online, public-facing data dashboard related to local and state SARS-CoV-2 data. Data management and cleaning of SARS-CoV-2 contact tracing data; supervision of data analysts and epidemiologists in the SARS-CoV-2 response.

Johns Hopkins University
Baltimore, MD, USA
Research Assistant, July 2018 – August 2020

Principal responsibilities: Conducted data analysis (quantitative, qualitative) on STI healthcare seeking behavior among adults with symptoms in Rakai, Uganda. Conducted a systematic literature review to provide the World Health Organization (WHO) with an evidence base for recommendations on self-sampling for sexually transmitted infections (STIs). Identified articles from electronic database search; screened titles, abstracts, and full text articles for relevance; and extracted, coded, and analyzed data (and will contribute to manuscript writing) to summarize findings for policymakers. Supported senior advisors and WHO technical experts in protocol decision-making and review inclusion/exclusion criteria; supported the drafting of WHO guidance and recommendations on STI self-sampling based on systematic review findings. Supported a systematic literature review on the impact of antiretroviral treatment on sexual risk behavior for a NIMH R01 synthesizing behavioral intervention effectiveness in developing countries

U.S. Centers for Disease for Disease Control and Prevention
Harare, Zimbabwe
Technical Advisor, September 2015 – July 2017
ASPPH/CDC Allan Rosenfield Global Health Fellow

Principal responsibilities: Technical Advisor and Activity Manager for the 2016 Young Adult Survey of Zimbabwe (YAZ), a national survey on violence experienced in childhood and HIV prevalence among persons ages 13-24 years; developed protocols, managed partner relations, drafted budgets, monitored field activities, conducted performance evaluations, developed and completed monitoring and evaluation dashboards. Reviewed protocols and products for scientific quality in support of the CDC-Zimbabwe Associate Director for Science (ADS) Office; supported abstract submissions and conference presentations. Member of the PEPFAR-Zimbabwe Key Populations; Strategic Information Technical Working Groups.

Johns Hopkins Center for Communication Programs (CCP)
Baltimore, MD, USA
Research Assistant, January – April 2015

Principal responsibilities: Assisted in the design and conduct of a retrospective study analyzing media coverage of the 2014 Ebola outbreak in Liberia. Liaised between Baltimore and field teams, managing research priorities.

Johns Hopkins University/B.J. Medical College, Pune, India
Research Assistant, September – December 2014
Global Health Established Field Placement Awardee, Johns Hopkins Center for Global Health

Principal responsibilities: Designed and managed a formative study assessing mobile phone access and usage patterns among patients at Sassoon General Hospital. Managed and supervised a cross-sectional study investigating the effects of air pollution; built capacity of in-country staff through data management trainings. Produced media content to advocate for tuberculosis care and treatment for local, low-income women.

U.S. President's Malaria Initiative (PMI), U.S. Agency for International Development (USAID)
Washington D.C., USA
Malaria Communications Intern, May – August 2014
Global Health Fellows Program-II Master's Intern, The Public Health Institute

Principal responsibilities: Assisted in internal and external PMI communication and documentation efforts. Wrote key fact sheets and progress reports on PMI initiatives for mass consumption. Developed, wrote and managed PMI social media content and website features. Supported the PMI Mission in Angola during a two-week, technical advising trip; collected original media content in support of PMI-Angola's recent successes.

Johns Hopkins University Student Outreach Resource Center (SOURCE)
Baltimore, MD, USA
Media and Marketing Coordinator, August 2013 – May 2014

Principal responsibilities: Developed and executed mass media and marketing campaigns for SOURCE activities and events. Managed and led the SOURCE Student Governing Board's Media and Marketing Subcommittee. Increased and maintained online presence through Facebook, Twitter and Instagram social media platforms.

Department of Environmental Health & Safety, The State University of New York (SUNY)
Cortland, Cortland, NY, USA
Secretary, May – August 2013

Principal responsibilities: Supported departmental communications and administration. Evaluated and updated campus-wide Emergency Response Plan and MSDS database. Researched and drafted campus-wide policy on Bloodborne Pathogen Protocol on Athletic Surfaces.

Global2000 Program, The Carter Center
Atlanta, GA, USA
Research Intern, December 2012 – April 2013

Principal responsibilities: Co-authored a literature review on the impact of trachoma control programs on UN Millennium Development Goals. Assisted in the coordination of the 2013 Annual Trachoma Program Review.

Mental Health Program, The Carter Center
Atlanta, GA, USA
Program Support Intern, September – December 2012

Principal responsibilities: Organized data, coordinated planning of Rosalynn Carter Mental Health Journalism Fellowship and Rosalynn Carter Symposium on Mental Health Policy. Assembled notes and presentations on international and local mental health policy and stigma for Emory University lectures, US Congressional briefings, and program donors.

HONORS & AWARDS

Honors:

- Fulbright-Fogarty Fellowship in Public Health, 2019-2020
- ASPPH/CDC Allan Rosenfield Global Health Fellow, 2015-2017
- Delta Omega Public Health Honor Society (Alpha Chapter), 2015
- Global Health Fellows Program-II Master's Intern, 2014
- AAAS Minority Science Writers Intern, 2011

Awards:

- Johns Hopkins University Center for Global Health Global Health Field Research Award, 2019
- Center for Qualitative Studies in Health and Medicine Dissertation Enhancement Award, 2019
- U.S. Embassy Harare Group Award, 2016
- John Snow, Inc. Award (JHSPH International Health Departmental Award), 2014
- Johns Hopkins University Center for Global Health Global Health Established Field Placement Award, 2014
- Deadline Club Scholar, 2011

PUBLICATIONS

Cox SN, Elf J, Lokhande R, **Ogale YP**, DiAndreth L, Dupuis E, Milovanovic M, Mpongose N, Mave V, Suryavanshi N, Gupta A, Martinson N, Golub JE, Mathad JS. Mobile phone access and comfort: implications for HIV and tuberculosis care in India and South Africa. Int J Tuberc Lung Dis 2019; 23(7):865–872. http://dx.doi.org/10.5588/ijtld.18.0542

Ogale Y, Yeh PT, Kennedy CE, Toskin I, Narasimhan M. Self- collection of samples as an additional approach to deliver testing services for sexually transmitted infections: a systematic review and meta- analysis. BMJ Glob Health 2019;4:e001349. doi:10.1136/ bmjgh-2018-001349.

Callahan K*, **Ogale YP***, Palmer SL, Emerson PM, Hopkins DR, Withers PC, Ngondi J. Trachoma control as a vehicle toward international development and achievement of the Millennium Development Goals. PLoS Negl Trop Dis. 2014 Sep;8(9): e3137. doi:10.1371/journal.pntd.0003137. *joint first-authors

PRESENTATIONS

Cox SN, Elf J, Lokhande R, **Ogale YP**, DiAndreth L, Dupuis E, Milovanovic M, Mpongose N, Mave V, Suryavanshi N, Gupta A, Martinson N, Golub JE, Mathad JS. Mobile phone access and comfort: implications for HIV and tuberculosis care in India and South Africa. Int J Tuberc Lung Dis 2019; 23(7):865–872. http://dx.doi.org/10.5588/ijtld.18.0542

Cox SN, Elf J, Lokhande R, **Ogale YP**, DiAndreth L, Dupuis E, Milovanovic M, Mpongose N, Martinson N, Mave V, Suryavanshi N, Gupta A, Golub JE, Mathad JS. Mobile Phone Access and Comfort: Implications for HIV and Tuberculosis Care in India and South Africa. Poster session presented at: Infectious Disease Society of America IDWeek 2018; 2018 Oct 3-7; San Francisco, CA.

Ogale YP, Elf J, Lokhande R, Roy S, Mave V, Gupta A, Golub J, Mathad J. Characteristics associated with mobile phone access among tuberculosis patients in Pune, India. Poster presented at: The 46th Union World Conference on Lung Health; 2015 Dec 2-6; Cape Town, South Africa.

VOLUNTEER EXPERIENCE

Generation Tomorrow, Johns Hopkins University Center for AIDS Research (CFAR)
Baltimore, MD
HIV/Hepatitis C Tester and Counselor, September 2018 – May 2019

Principal responsibilities: Volunteered as a part of the Generation Tomorrow program. Conducted HIV and HCV testing, counseling, and education outreach on behalf of the Johns Hopkins Hospital Outpatient Center.

MEDLife,
Riobamba, Ecuador
Spanish Interpreter & Mobile Clinic Volunteer, May 2010

Principal responsibilities: Acted as a Spanish language translator for foreign medical doctors during mobile clinic outrace activities in rural Riobamba, Ecuador.

Nemours/Alfred I. duPont Hospital for Children
Wilmington, DE, USA
Spanish Medical Interpreter & Child Life Assistant, May – August 2010

Principal responsibilities: Volunteered as a Spanish medical interpreter, as well as an assistant with the Child Life program to provide recreational therapy to children in long-term care.

CERTIFICATIONS & ADDITIONAL TRAINING

Certifications:

- HIV/AIDS & Hepatitis C Testing and Counseling, Baltimore City Department of Health, 2019

Additional training:

- Principles of STI/HIV Research and Public Health Practice Course, University of Washington, 2020

PROFESSIONAL ACTIVITIES & PRACTICE

Professional societies:

- Events Coordinator – Johns Hopkins Bloomberg School of Public Health African Public Health Network (APHN), 2018-2019

Academic groups:

- UJMT Fogarty Global Health Fellowship Webinar, 2019-20
- Rakai Health Sciences Program Doctoral Student Group, 2019-20
- Rakai Health Sciences Program HIV/STI Journal Club, 2018-19

Editorial activities:

- Peer review journal manuscripts – Sexually Transmitted Diseases, 2019-20

Teaching:

- Teaching Assistant – Integrative Activity in Global Health Planning and Management, JHSPH, Spring 2020
- Teaching Assistant – Integrative Activity in Community-Based Primary Health Care, JHSPH, Spring 2020
- Guest lecturer – Qualitative Analysis Methods, Qualitative Researchers Group, The Infectious Disease Institute at Makerere University, Fall 2020
- Teaching Assistant – The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health, JHSPH, Fall 2019
- Teaching Assistant – Qualitative Research Theory and Methods, JHSPH, Spring 2019
- Teaching Assistant – Health Behavior Change at the Individual, Household and Community Level, JHSPH, Fall 2017 & Fall 2018
- Teaching Assistant – Professional Development Workshops: Effective Online Searching, JHSPH, Fall 2018
- Teaching Assistant – Global Disease Programs and Policies, JHSPH, Spring 2015

TRAINING & RESEARCH GRANT PARTICIPATION

Completed research support:

Title: Self-collection of Samples for STI Testing in Rakai, Uganda: Strengthening Evidence for Interventions
Dates: May 2019 – May 2020
Sponsoring Agency: Hopkins Population Center (HPC) and The Alliance for a Healthier World (AHW)
Funding: $25,000
Principal Investigators: Caitlin E. Kennedy, M. Kathryn Grabowski, Fred Nalugoda
Abstract: Sexually transmitted infections (STIs) are of global concern with rates hypothesized to be rising in settings where HIV is coming under control. Syndromic management of STIs is a common approach to STI case detection in resource-limited settings but experts doubt its ability to impact STI burden. Self-collection of samples (SCS) for STI testing may be a way to facilitate the expansion of STI diagnostic services. However, little research exists on the implementation of SCS in sub-Saharan Africa. This study aims to strengthen the evidence base for SCS for STI testing by assessing the validity and acceptability of SCS methods in Rakai, Uganda. Findings will be used to support future research on SCS for STI testing interventions and HIV/STI service integration.
Role: Research Assistant, Field Supervisor

ADDITIONAL SKILLS

Language:

- English – excellent (read, write, speak)
- Spanish – good (read, write, speak)
- Farsi – excellent (speak), fair (read, write)
- French – fair (read, write, speak)
- Hindi – fair (read, write, speak)

Software: Microsoft Word, Excel, PowerPoint, STATA, ArcGIS, MAXQDA

Media: Final Cut Pro, Avid, Adobe Photoshop, Adobe Premiere Elements, Audacity, Tumblr, Wordpress, Prezi, Facebook, Twitter, Pinterest, Instagram, TikTok

Journalism: Television, radio, web, magazine, documentary film, photography. Full portfolio and clips available online at www.yasminogale.com